DOCUMENT RESUME

ED 239 919 SE 044 105

AUTHOR	Appel, Gary; And Others
TITLE	The Growing Classroom: A Garden-Based Science and Nutrition Curriculum for 2nd through 6th Grades. Book 3: Nutrition.
INSTITUTION	Live Oak School District, Santa Cruz, CA.
SPONS AGENCY	Department of Education, Washington, DC.
PUB DATE	82
NOTE	164p.; Developed by Project Life Lab. For Books 1 and 2, see SE 044 103-104.
AVAILABLE FROM	Friends of the Harvest, 809 Bay Ave., Suite H, Capitola, CA 95010 ($33.00 per set).
PUB TYPE	Guides - Classroom Use - Guides (For Teachers) (052)
EDRS PRICE	MF01/PC07 Plus Postage.
DESCRIPTORS	Activity Units; Consumer Education; Cooking Instruction; Demonstration Programs; Discovery Learning; Elementary Education; *Experiential Learning; *Health Activities; *Health Education; Interdisciplinary Approach; Learning Activities; *Nutrition Instruction; Validated Programs
IDENTIFIERS	PF Project; Project Life Lab; Recipes (Food)

ABSTRACT

This guide for teaching nutrition is Book Three in Project Life Lab's (Santa Cruz, California) three-part curriculum for a garden-based science and nutrition program for grades 2-6. The curriculum is designed for use as an integrated program, but the books can be used independently. It is suggested that the use of student journals can greatly enhance the effectiveness of the curriculum by providing a place for students to record data and observations as well as feelings. The use of journals is referred to in many of the lessons. Divided into six units, this book contains lessons on: (1) food choices; (2) the basic four food groups; (3) nutrients; (4) digestion; (5) food consumerism; and (6) recipes for snacks based upon information learned in the preceding lessons. Each lesson provides the stated purpose of the lesson, a list of all necessary materials, the type of activity to be carried out along with needed background information, discussion questions for tying the lesson together, and additional activities and follow-up lessons. (JW)

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The Growing Classroom

Book 3

Nutrition

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GARDEN
SAL3
NUTS HAVE PROTEIN
PEARS
RADISH ES
ORANGE VITAMIN C
GOOD FOR YOU
ZOO KINI
PINE APPLES

SE044105

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PROJECT OVERVIEW

CATALOG NUMBER: FP 000 359

PROJECT TITLE: Life Lab (2-6)

LOCAL EDUCATIONAL AGENCY:

Live Oak School District

ABSTRACT:

Life Lab is a science and nutrition program which facilitates critical thinking and academic learning as applied to an indoor or outdoor laboratory site. The laboratory allows students to apply concepts in science: problem solving/communication; awareness/discovery; soil; growing; photosynthesis; cycles and changes; interdependence; insects, flowers, and pollination; energy; and recycling. Concepts in nutrition are not only learned but also integrated with student eating habits as the students apply units in food choices, basic 4 food groups, nutrients, digestion, consumerism, and recipes. The curriculum, entitled The Growing Classroom, consists of three books. Book 1 is a guide to starting a school garden. Book 2 contains the ten science units listed above. Book 3 is the nutrition curriculum. The curriculum is best used as an integrated program; however, the books can also be used independently with success. Teachers with little background in science and nutrition find the activities easy to teach.

ADDRESS:

Project Life Lab
966 Bostwick Lane
Santa Cruz, CA 95062

CONTRACT: ESEA Title IV-C, #4296
E/I 1982-83

PUBLICATION DATE: 1982

STATUS: Active

DESCRIPTORS:
- Critical Thinking
- Demonstration Programs
- Environmental Education
- Interdisciplinary Approach
- Learning Laboratories
- Nutrition Instruction
- Outdoor Education
- Sciences

TARGET GROUP(S):
- Elementary School Students
- Elementary School Teachers

TEACHING METHODS:
- Discovery Learning
- Experiential Learning
- Group Instruction
- Interdisciplinary Approach
- Learning Laboratories

LEARNING ACTIVITIES:
- Gardening
- Health Activities
- Outdoor Activities
- Science Activities

PROJECT MATERIALS:

Catalog Number	Title	Site
FD 002 112	The Growing Classroom Book 1: Becoming a Farmer (2-6)	C/N/S
FD 002 113	The Growing Classroom Book 2: Science (2-6)	C/N/S
FD 002 114	The Growing Classroom Book 3: Nutrition (2-6)	C/N/S

DA
5/83

THE GROWING CLASSROOM

A Garden-Based Science and Nutrition Curriculum

For 2nd through 6th Grades

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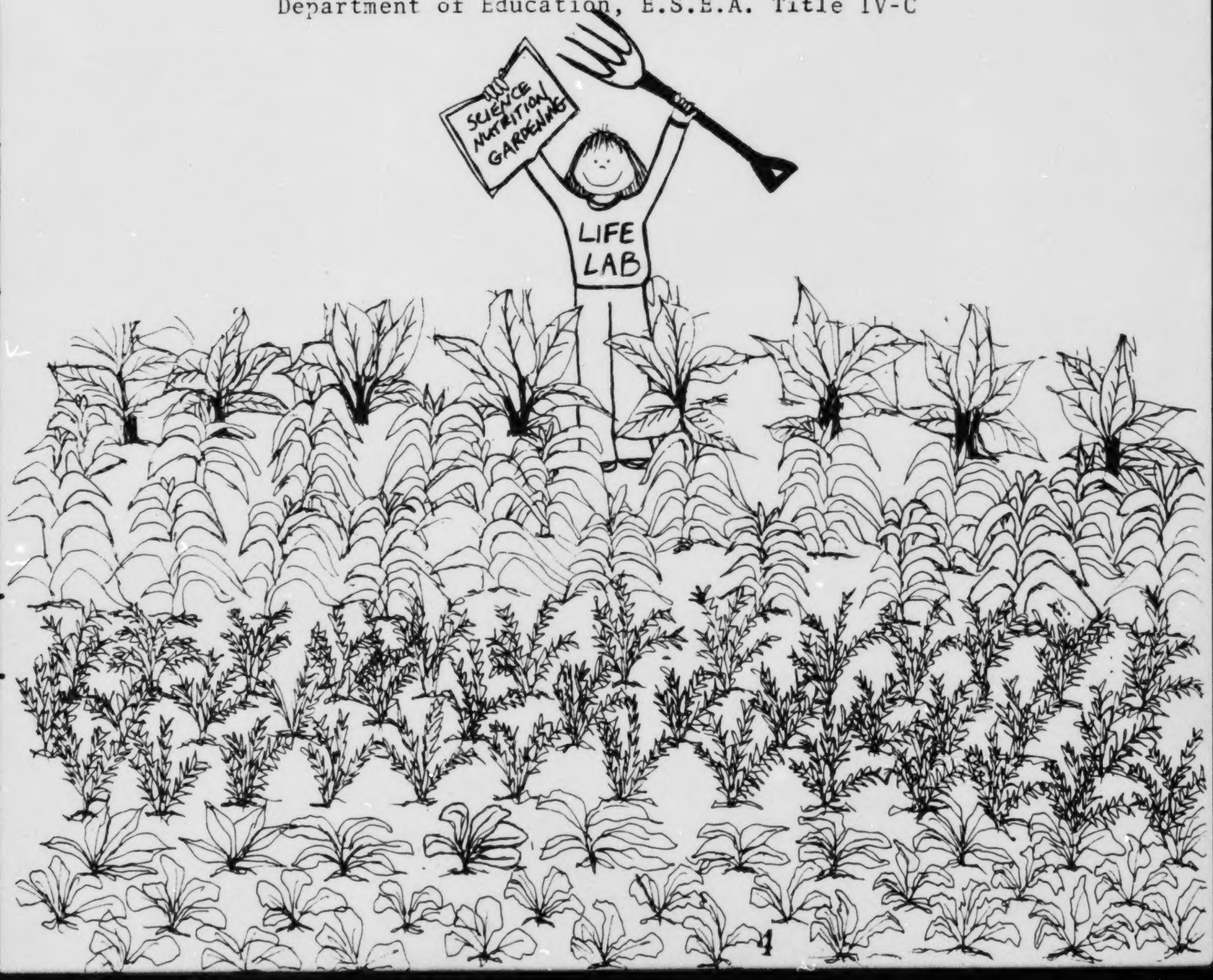
developed by
Project Life Lab
Live Oak School District
Santa Cruz, Ca.

through funds provided by the
Department of Education, E.S.E.A. Title IV-C



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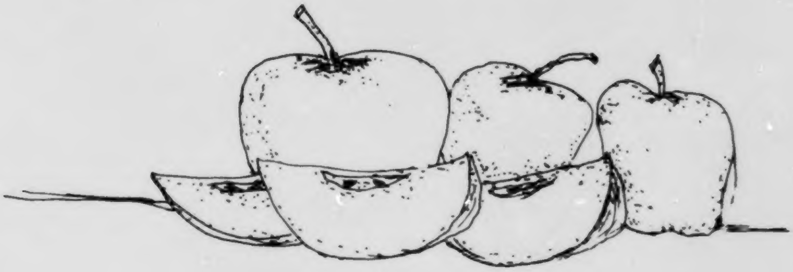


1st printing: April, 1982 thanks to the California Dept. of Education Title IV-C
2nd printing: November, 1982 thanks to the California Dept. of Food & Agriculture, Division of Integrated Pest Management

Published by FRIENDS of the HARVEST, a non-profit organization dedicated to improving elementary science education. For more information or sets of The Growing Classroom write:

Friends of the Harvest
966 Bostwick Lane
Santa Cruz, California
95062

HOW TO USE THESE BOOKS

This curriculum has been prepared as a tool for teacher use in developing a garden-based science and nutrition program. It is divided into three books for easy use. All sections and units are identified with a salmon-colored cover page. The pages of the three books are numbered in sequence to facilitate cross-referencing.

Book One is a guide to starting your school garden. It consists of three sections:

- Breaking Ground
- Cultivating Support For Your Growing Classroom
- Basic Gardening and Experimental Beds

Book One contains a Table of Contents for all three books. In addition, Books Two and Three have individual Table of Contents.

Book Two contains the Science Curriculum. It is divided into ten units:

- Problem Solving/Communication
- Awareness/Discovery
- Soil
- Growing
- Photosynthesis
- Cycles and Change
- Interdependence
- Insects, Flowers, and Pollination
- Energy
- Recycling

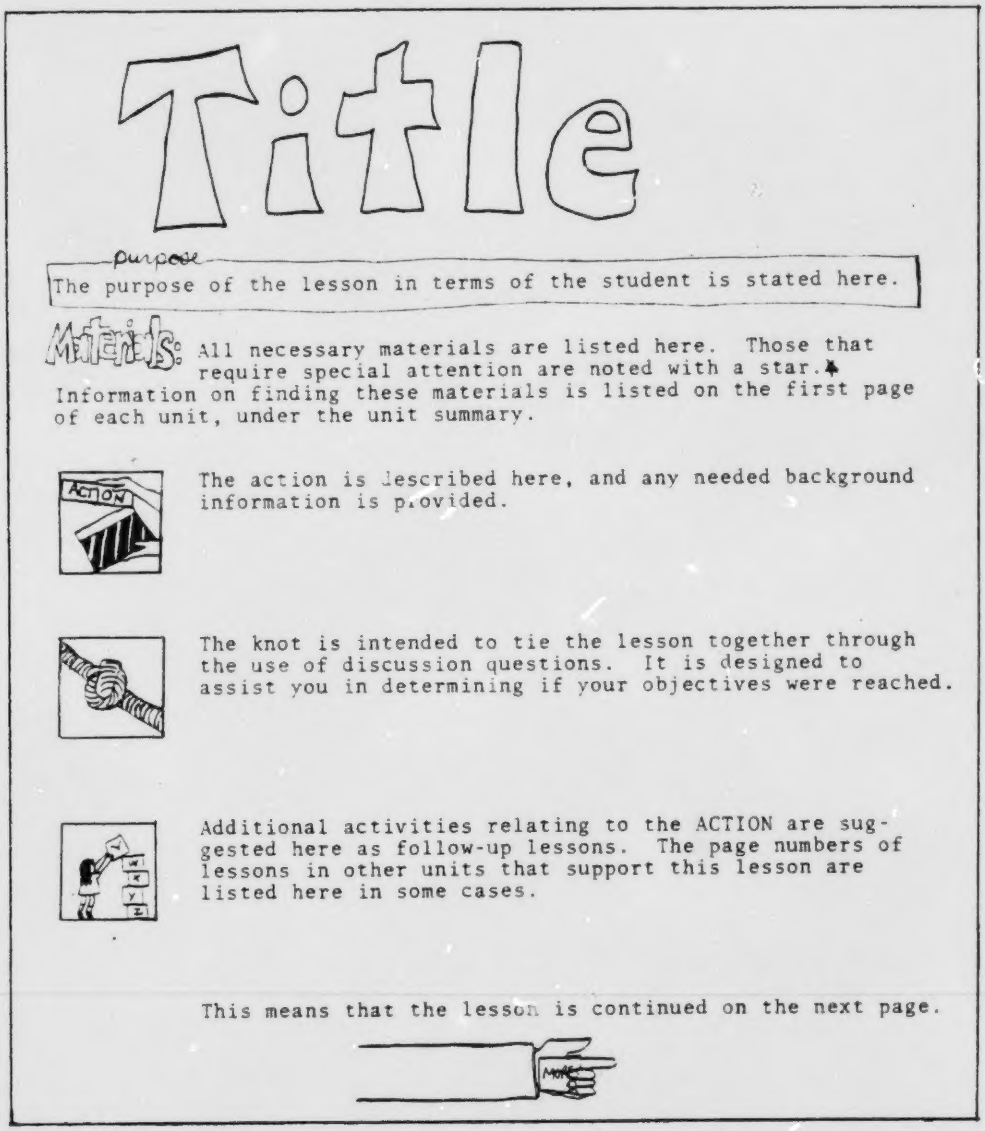
Book Three contains the Nutrition Curriculum. It is divided into six units:

- Food Choices
- Basic Four
- Nutrients
- Digestion
- Consumerism
- Recipes

The Science, Nutrition, and Gardening Curriculum is best used as an integrated program. The books can also be used independently. For example, you may choose to use the Nutrition book, foregoing the Science and Gardening books. Or you may simply use the Gardening book and start a class garden. Thus, you can develop your program one step at a time.

The salmon-colored cover pages of the Garden, Science, and Nutrition Curriculum units include: the unit title, a brief unit summary, titles of that unit's lessons, recommended grade levels, and a list of places to find a few special materials.

Each of the lessons is presented in a similar format. The lesson format is presented below:



Title

purpose

The purpose of the lesson in terms of the student is stated here.

Materials: All necessary materials are listed here. Those that require special attention are noted with a star.★ Information on finding these materials is listed on the first page of each unit, under the unit summary.

The action is described here, and any needed background information is provided.

The knot is intended to tie the lesson together through the use of discussion questions. It is designed to assist you in determining if your objectives were reached.

Additional activities relating to the ACTION are suggested here as follow-up lessons. The page numbers of lessons in other units that support this lesson are listed here in some cases.

This means that the lesson is continued on the next page.

In addition, use of a student journal can greatly enhance the effectiveness of this curriculum. Journals can serve as both a place for students to record data and information regarding their experiments, and as a focus for feelings and observations. The more kids explore their world, the more they want to communicate the results of their explorations. Capitalize on this through use of the journal. It is referred to in many lessons.

NUTRITION

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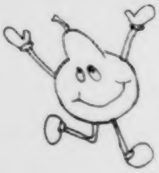

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Food Choices

PEANUT BUTTER
YOGURT
MILK
ALMONDS
hmmm ..

The Food Choices unit introduces our study of nutrition. The unit demonstrates that we continually make decisions about what we eat -- and what we choose to eat -- that are very important to our bodies. Language arts, reference skills, graphing, art, and experiential activities are used to explore why we eat, what is available to eat, what we like to eat, and the importance of eating a healthy breakfast.

Food Choices is taught to our 3rd grade classes,and serves as a good introduction to all students studying nutrition for the first time.

Lesson Titles	Recommended Grade Levels
Keep Me Running	2 - 3
I Eat My Peas	2 - 3
How Do We Make A Horse Into Jello?	2 - 3
Stems, Root, Leaf, or Fruit?	2 - 3
Are You A Natural?	2 - 3
When I Was Little	2 - 3
Roots Of Food	2 - 3
Hear Us!	2 - 3
The Good, The Bad, And The Ugly	2 - 3
On Your Mark, Get Set, Breakfast!	2 - 3
Snap, Crackle, Pop! On The Button	2 - 3

Special Materials & Where To Find

Food Cards - A set of laminated food pictures with nutritional information on reverse side (used for many lessons).

Order from - National Dairy Council, 6300 North River Road, Rosemont, IL 60018. #B012B Food Models - $6.00.

Hand Flour Mill - Borrow floor model from a local natural foods store.

* The above materials are listed to assist you in locating them. All materials are listed with each lesson and most are readily available.

Keep Me Running

purpose

To introduce how our bodies' use food.

Materials

- Energy, Growth, Keeping Healthy Posters (pp. 273-275);
- Drawing paper, crayons, scissors.

In this lesson students will learn why we eat. Food is the fuel that keeps our machine running. It provides growth, energy, and maintenance (healthy bodies and repairs us when ill).

*Discuss with students why they eat. What does food do for their bodies? Have students act out roles that show an object other than a person performing activities that require energy, growth, or maintenance of health.

Examples:

Energy: A car driving around. (What does it use up as it moves? What do you do when it can't move?)

Growth: A seedling. (What will the seedling need to grow into a plant? How does it get it?)

Maintenance: A machine that you use all the time. (What would you do to it to keep it running smoothly?)

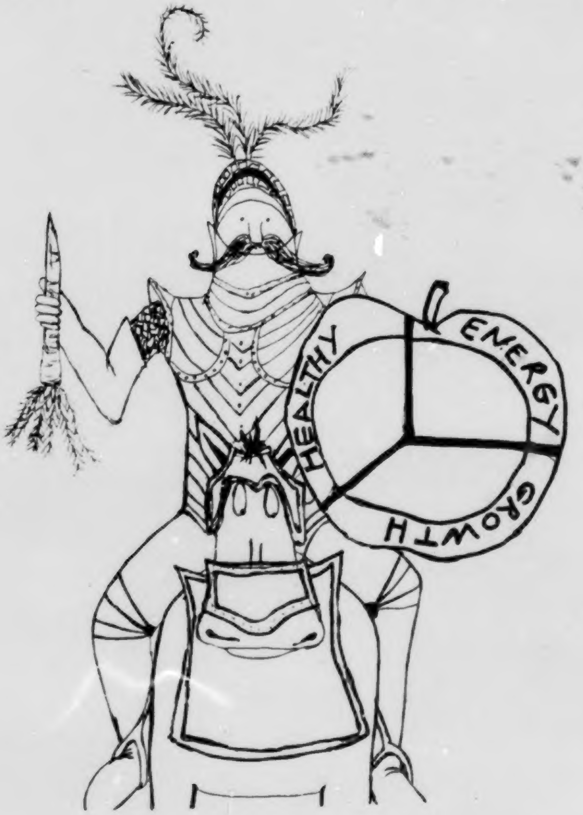
MORE

In the same way, our bodies use nutrients from food we eat to help us grow, to keep us healthy, and to give us energy. (Use posters.)

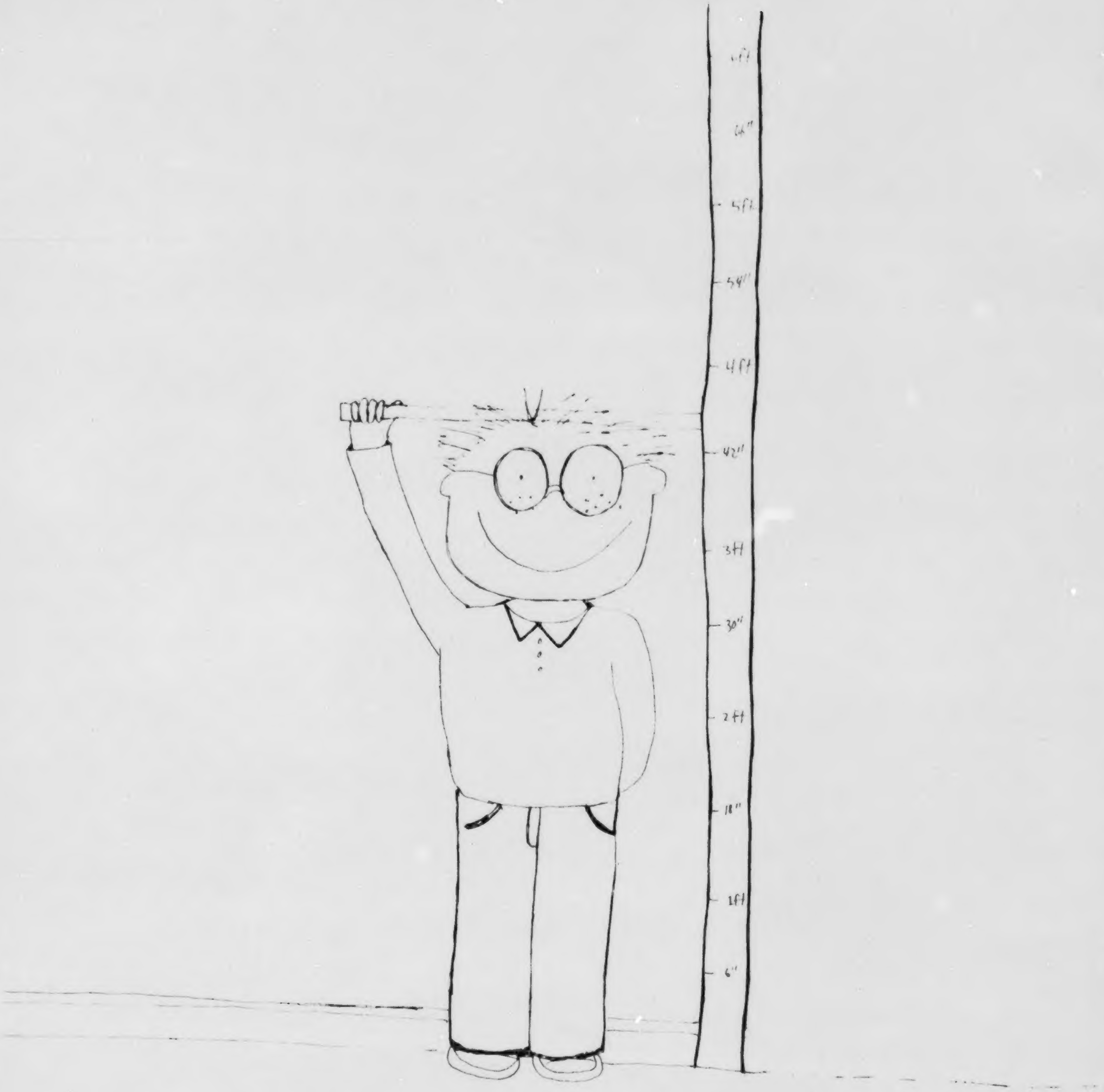
*To help students further define energy, growth, and maintenance have them make their own food shield. Instruct them to draw as large an outline as possible of their favorite food. (They can cut this out.) Divide the shield into three sections: Energy; Growth; Maintenance. In each section ask students to draw pictures of examples of themselves and/or other objects. (Child running; room being cleaned; etc.) They can draw pictures of foods that they think help them to grow, give energy, keep them healthy.

*Ask student if they can name one perfect food that can provide everything our body needs to grow, get energy, and maintain itself. There is no one food that is perfect. A variety of foods is necessary to provide all of the nutrients necessary to keep our bodies healthy. When our bodies do not have the necessary fuel going to all of their parts, they are under stress.

How does food help our bodies? Why do you need energy? What happens to a plant if it doesn't get what it needs to grow? Name one food that can provide everything your body needs to stay healthy, grow, and have energy. What would you like to learn this year about the food choices you make?



ENERGY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66"
5ft
54"
4ft
42"
3ft
30"
2ft
18"
1ft
6"

GROWTH

STAYING HEALTHY

PHYSICAL
EDUCATION

I Eat My Peas With Honey....

purpose

To introduce the individual decision making process in choosing foods to eat.

Materials: journal, pencil

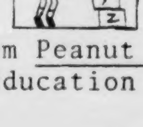
This survey will use writing and communication skills to demonstrate how and why students make food choices.

*Have each student conduct the following survey:

1. Name your favorite food __________________________.
2. Find two people in your classroom who like the same food you do.
3. Find one person in your classroom who dislikes your favorite food. Ask them to try and think why they don't like that food. List two reasons below:
   1. __________________________
   2. __________________________
4. Make a list of foods you don't like below.
5. Look at the foods on your list. Can you think of reasons you don't like each food. Write the reasons beside each of the foods.
6. Now make a list of your favorite foods.
7. Write the reason you like each of these favorite foods.

*Discuss with students how and why they made these choices; Do they consider some foods 'good' or 'bad'; why?

Who chooses what you eat? What affects whether you like or don't like a food? Why can you like a food, but it not be good for you? Do you like to try new foods? Why or why not?



Make a food sample tray of foods the students probably have not tried: raw vegetables (broccoli, spinach) with dip; humus (garbanzo dip); see recipes (p. 401-403).

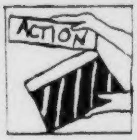
Adapted from Peanut Butter and Pickles, Humboldt County Office of Education

How Do We Make a Horse Into Jello?

purpose

To understand all food comes from plants and animals.

Materials: Find pictures of foods and pictures of plants and animals that are the source of those foods.



In this lesson students will identify the plants and animals from which a variety of foods are derived. Today many foods are processed into forms so that their source is not recognizable. However, we are dependent upon the original plants and animals for all of our food.

*Have students identify the source for specific food pictures by holding up the proper source pictures.

*List all sources on the blackboard. Have students categorize them into animals and plants. Is there any source that is not an animal or plant?

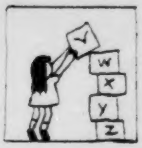
Suggested Foods

ketchup
TOMATO SAUCE

Food	Source
ketchup	tomato plant, sugar cane, spices
hamburger	cow
french fries	potato plant
raisins	grapes
peanut butter	peanuts
grape jelly	sugar cane/beets, grapes
spaghetti	wheat
cornflakes	corn plant
crackers	wheat, water, salt
cheese	cow
popcorn	popcorn plant
bologna	cow
jello	hooves

chili	bean, cow, tomato
pickles	cucumbers
ice cream	cow, sugar cane

Identify three foods you eat that are in the form of their source (natural); Identify three foods that do not resemble their source; Predict what would happen if houses are built on land where we grow food. Why are plants and animals so important to us?



*Classify plants into: fruits, vegetables, nuts, legumes, and grains. Sort samples into five labeled cans. Prove they're plants by sprouting them.

*Discuss meat-eaters and vegetarians. Find out why some people do not eat meat. Which of the above foods would a vegetarian not eat?

Adapted from Energy, Food, and You, Washington State Office of Environmental Education

Q78

Stem, Root, Leaf, or Fruit? Let's Play Food Anatomy

purpose

To discover that much of our diet is composed of food from different parts of plants.

*Have students make five category headings in their journals: Stem, Root, Leaf, Fruit, and Seed.

*Read (or hand out) the following list of foods to students. Tell them to place the food in one of the above categories, according to what part of the plant we eat (e.g. walnut is a seed, eggplant a fruit, etc.)

TOMATO
BROCCOLI
POTATO
LETTUCE
PEA
CARROT
CELERY
BEAN
WHEAT
ONION
CAULIFLOWER
CORN
PEACH
PEANUT
SQUASH
APPLE
BANANA
ACORN
EGGPLANT
RICE
WALNUT

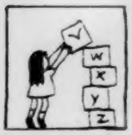
*Now try spices! This tends to be a little more difficult for students, so if they have difficulty placing the spices in categories, help guide them through.

Categories are: Leaf, Seed, Stem and Bark; a completed list might look like this:

Leaf		Seed	Stem	Bark
basil	sage	pepper	garlic	cinnamon
parsley	chives	coriander		
oregano	fennel	cardomum		
rosemary	thyme	dill		
dill		caraway		

*To introduce students to this wonderful world of spices, try bringing in examples of each spice.

Have students design a three-course meal composed only of nuts (or leaves, or roots, etc.). How would they enjoy such a meal?



Have students describe their last meal in terms of plant parts. For example, a peanut butter and jelly sandwich would be ground-up seeds (peanut butter) and crushed fruit (jelly) on ground-up and baked grass seeds (bread).

ARE YOU A NATURAL?

purpose

To learn the nutritional value of natural foods vs. processed foods.

Materials: Samples of: a wheat plant; wheat berries; whole grain flour, white flour; a hand flour grinder;☆ pencil and journal; ingredients for breadmaking (p.408).

This lesson consists of three parts.

Part I defines foods according to their processing.

Part II uses wheat as an example to demonstrate how processing affects nutritional value.

Part III instructs students how to grind flour and bake bread.

PART I

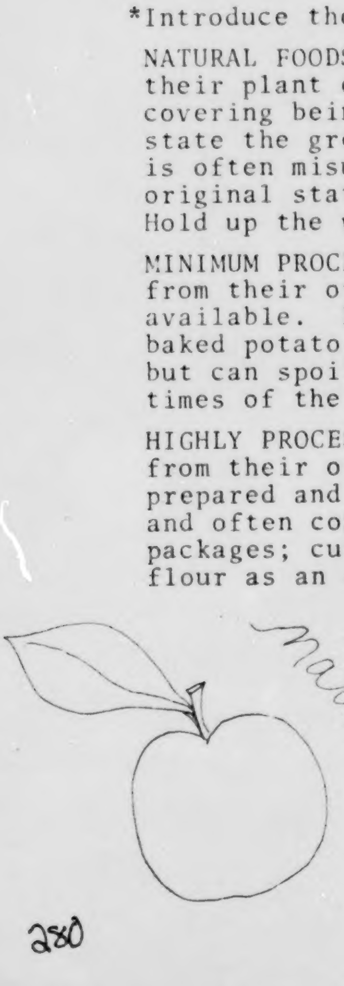
*Introduce the following definitions:

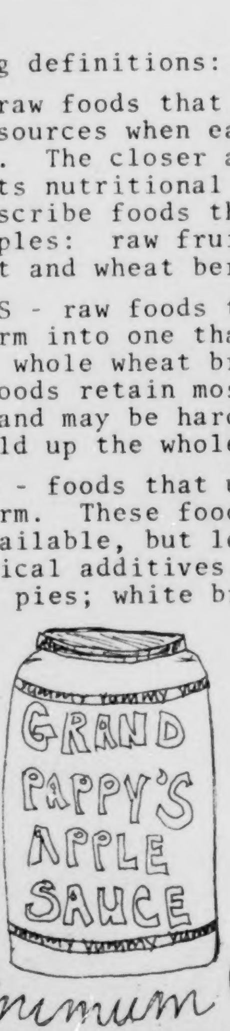
NATURAL FOODS - fresh raw foods that undergo no changes from their plant or animal sources when eaten, other than outer covering being removed. The closer a food is to its natural state the greater is its nutritional value. (Note: Natural is often misused to describe foods that are not in their original state.) Examples: raw fruits, vegetables, nuts. Hold up the wheat plant and wheat berry as examples.

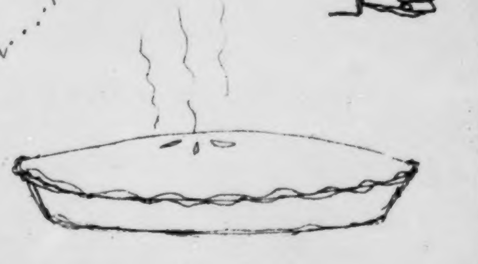
MINIMUM PROCESSED FOODS - raw foods that are slightly changed from their original form into one that is more usable or available. Examples: whole wheat bread; peanut butter; baked potato. These foods retain most of their nutrients, but can spoil quickly and may be harder to obtain at certain times of the year. Hold up the whole wheat flour as an example.

HIGHLY PROCESSED FOODS - foods that undergo considerable change from their original form. These foods are generally quickly prepared and easily available, but lose nutrients in processing and often contain chemical additives. Examples: foods in packages; cured meats; pies; white bread. Hold up the white flour as an example.

MORE







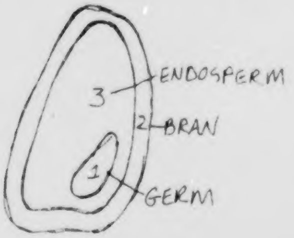
natural...minimum processed...highly processed

280

PART II

*Wheat is used around the world as a basic food in breads, cereals, spaghetti, etc. Depending how it is processed (milled) into flour it may or may not lose many of its nutrients.

Have students draw a whole wheat berry (the seed of the plant) and label its parts.



1) The Germ is the embryo or seedling plant within the grain. It contains the most nutrients in the berry.
2) The Bran is the seed coat and contains nutrients second to the germ.
3) The Endosperm is the large starchy interior and provides the food for the embryo. It contains the least amount of nutrients.

Whole wheat flour has all parts of the wheat berry in it. White flour has only the endosperm in it. Even when the white flour is "enriched" (nutrients added to the milled flour) only 4 or 5 of the 20 nutrients removed in the processing are replaced.

PART III

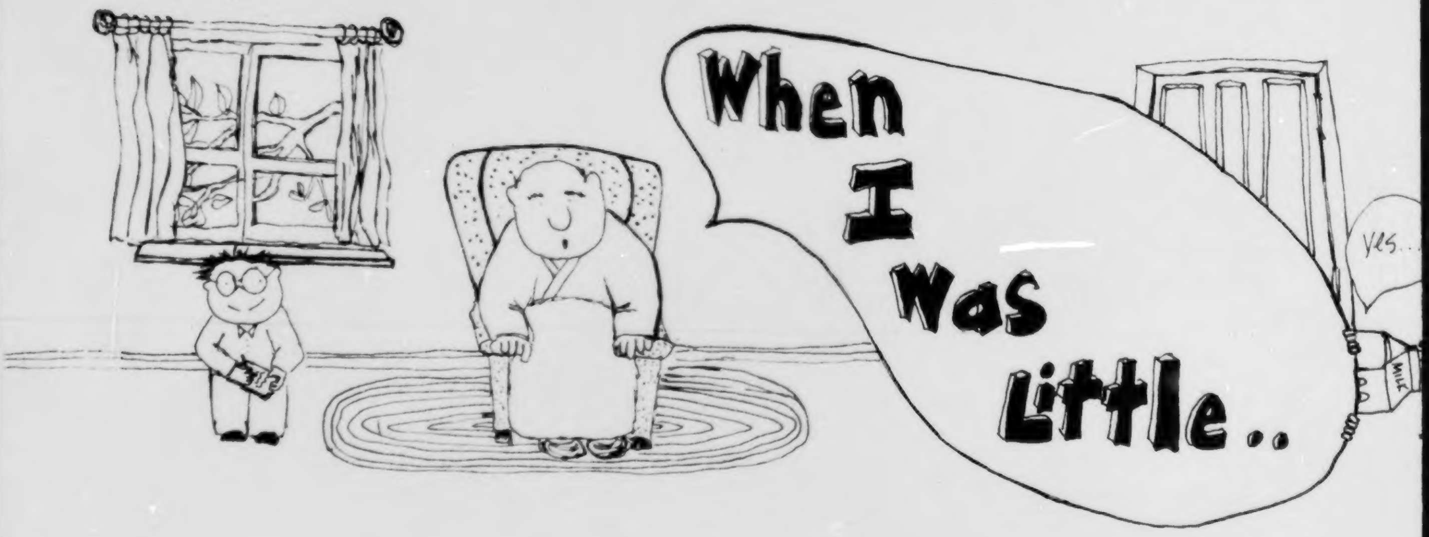
*Use a hand grinder to mill wheat berries into whole wheat flour. Seven cups of berries will produce ten cups of flour. Pass it through the grinder twice so that it is fine enough for baking.

*Use the whole wheat flour to bake Mrs. Price's bread on page 408.

Why is whole wheat flour better for you then white flour? Give an example of a food in its natural form; minimum processed form; highly processed form. List an advantage and disadvantage for the three types of food. Why are there so many highly processed foods used in our society?

Do a bread taste test with different types of bread. Have students compare nutritional value and taste preference.

NUTRITIOUS
WHOLE
WHEAT
FLOUR


When I Was Little..
yes...
MILK

purpose

To demonstrate how eating habits have changed over the past two generations, and to develop an idea of the roots of food choices.

Materials: journal, pencil

This exercise will use writing and oral communication to research food changes over the past two generations.

*Have students prepare a questionnaire about food and food habits. Using this questionnaire they will interview a grandparent or someone of that generation.

Possible questions:

1. What foods did you eat when you were little that you don't eat much of now or not at all?
2. Where did you get your food?
3. Were there foods that were prepared differently than today?--Like homemade breads versus store bought?
4. How often did the family eat together?
5. Do you eat any foods today that seemed strange or unappetizing when first introduced to you?
6. At what time of day did you eat your largest meal?
7. Did you eat out? If so, where? How often?
8. What was your favorite food as a child?
9. Do you think foods are better or worse today?

*Have students analyze the responses by looking at changes in eating habits.

Adapted from Peanut Butter and Pickles, Humboldt County Office of Education

MORE

Summarize your interview. Compare how two eating habits have changed over the years. Name an old eating habit that you would like to practice. Trace the development of an old eating habit into a modern eating habit.

*Invite a panel of 'grandparents' to school to be interviewed by the whole class.

*Have some seniors work with a group of students to prepare an old fashioned meal.

*Research food preferences in different historical periods. Can they be traced to modern habits?

ME EATUM CLUBBED SABER TOOTHED TIGERS. HOW ABOUT YOU?

The Roots of Food

purpose

To discover sociological influences on food choice.

In this lesson students will learn influences on their own food choices and those of people in different cultures.

There are many factors that influence our choice in food as well as what is available to us: culture, religion, agriculture, medicine, tradition, economics, history, geography, climate, social status.

*Discuss with students what influences their food choices with the objective being their understanding of some of the above cultural factors.

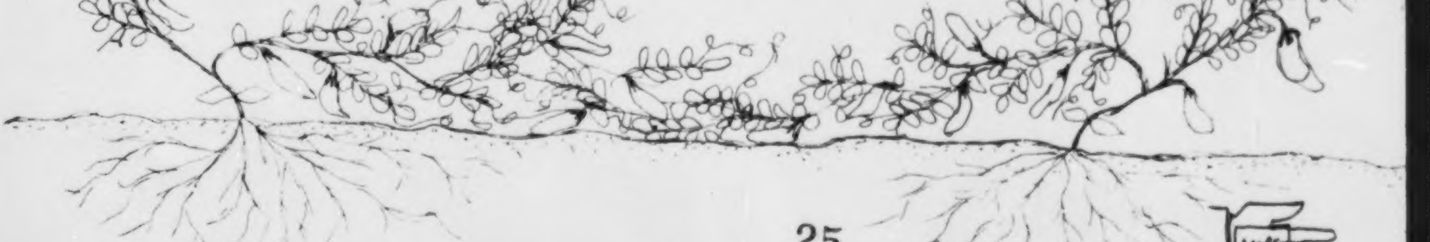
*Name a sociological factor that influences food choice in your community. Have students respond with a food they eat because of that factor.
Examples: At the first Thanksgiving celebration, pilgrims and Native Americans shared certain foods. We eat turkey because of that historical tradition. We live by the ocean, therefore we eat fresh fish.

*Make up two lists: one of people in a specific environment; the second of a specific food choice. Have students match the appropriate person with the food that person would select.

List suggestions:

I AM A PERSON WHO	I CHOOSE TO EAT
LIVES BY THE OCEAN	SHRIMP
HAS A GARDEN	FRESH SALADS
LIVES IN ALASKA	CANNED VEGETABLES
LIVES WITHOUT ELECTRICITY	NO ICE CREAM
IS ALWAYS IN A RUSH	MCDONALD'S HAMBURGER
LIVES IN HAWAII	FRESH FRUITS LIKE PINEAPPLE
HAS HIGH BLOOD PRESSURE	FOOD WITHOUT SALT
IS A HINDU	NO MEAT FROM A COW

*Have students make up their own by one person announcing who they are and another naming a food that person would eat.



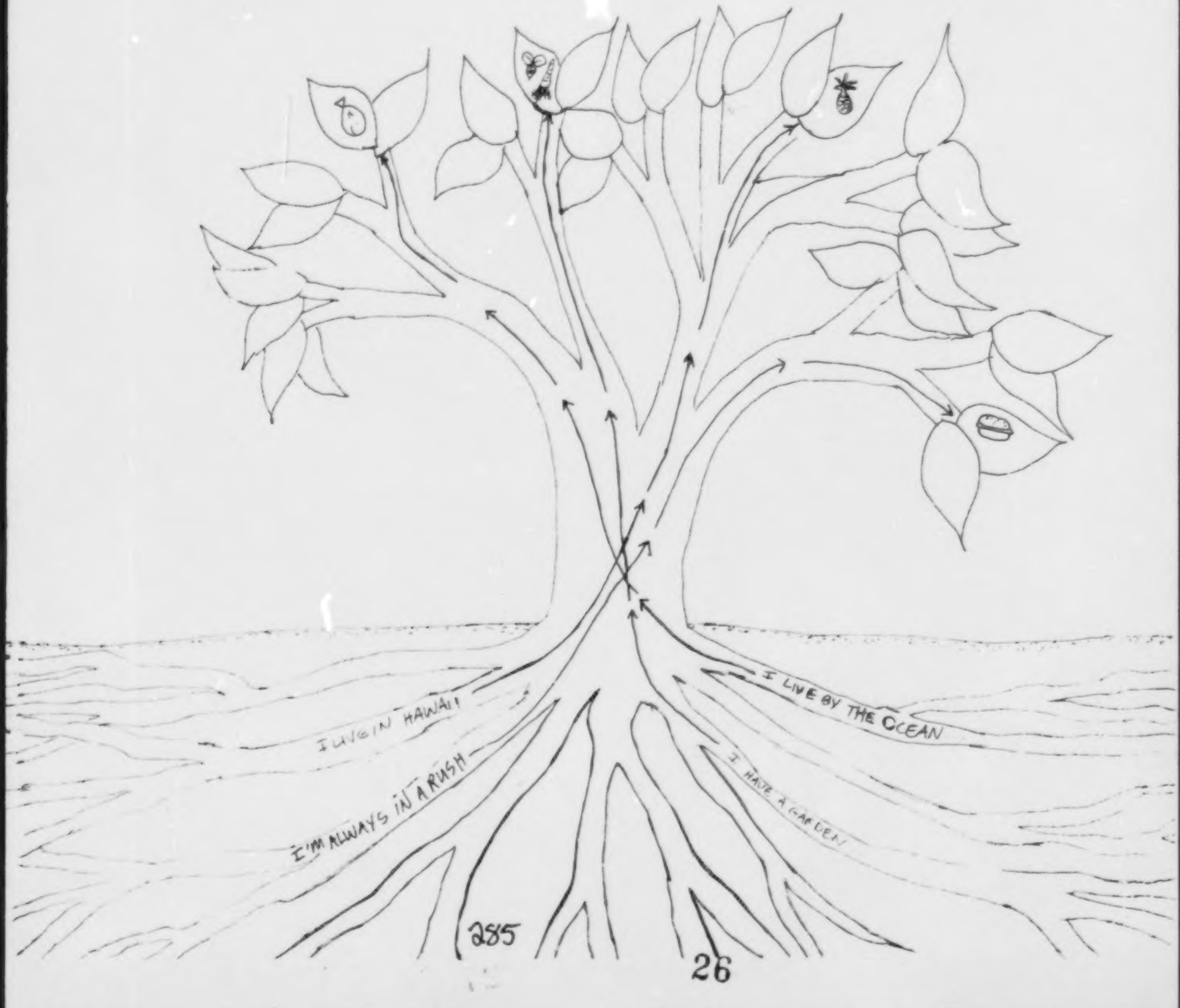
MORE

Name three possible differences between food choices of a person who lives in Bangladash and you. What are the reasons for those differences? Discuss why you are able to eat your favorite food in your community. Describe a community where a person may not find your favorite food.

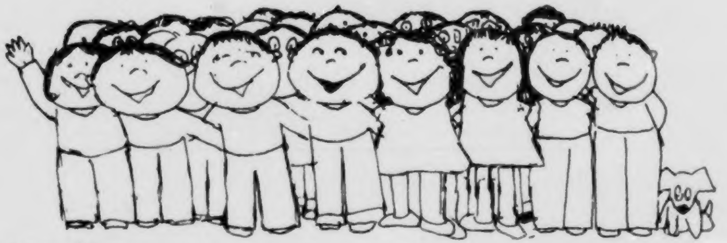
*Research food preferences of different cultures within your community. Invite someone to class to explain the development of those food choices.

*Prepare a meal of a culture or historical time period the class is studying.

*Create a community food root tree. Let the leaves of the tree represent different foods eaten in your community. The roots represent specific factors that lead to the eating of that food. Connect the roots to the appropriate leaves.


I LIVE IN HAWAII
I'M ALWAYS IN A RUSH
I LIVE BY THE OCEAN
I HAVE A GARDEN

Hear Us! Hear Us!



purpose

To use graphing as a means of voicing food preferences.

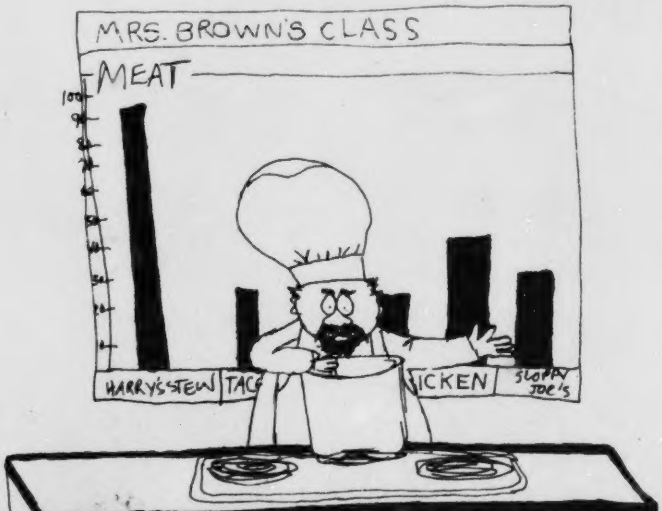
This lesson will give students an exercise in graphing while giving them an opportunity to voice their food preferences to the cafeteria.

*Make five graphs labeled: Fruit, Vegetables, Beverages, Grain, Meat. Take nominations for seven favorite foods in each category. List nominations on bottom of each chart. Vote and record on the charts, the number of students who prefer that food. Send results to the Food Services Manager.

Which food was the class favorite in each category? Name a grain that you like that is not on the graph. Which was the overall favorite food in the class? If you were the Food Services Manager how would you use this information?

*Write letters to the Food Services Manager to accompany the graph.

*Invite the Food Services Manager to class to talk about how the information could be used.



The Good, The Bad, and The Ugly

purpose

To examine the importance of breakfast and breakfast foods that are good for you and not so good for you.

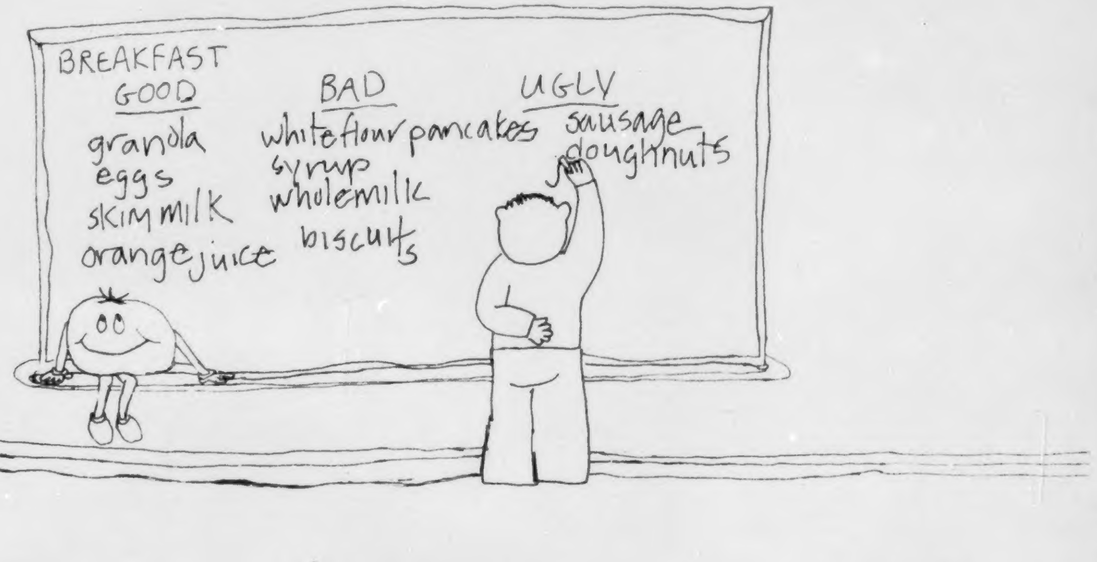
Materials: Breakfast Food Cards;* sample cereal cartons with ingredients high in sugar and no sugar, etc.

ACTION

In this lesson students will use reference skills to categorize breakfast foods according to their food value.

*Discuss with students how many ate breakfast this morning and why or why not. Studies have shown that students who don't eat a good breakfast often have trouble doing as well as they could in school. If we start the day without any food energy, we will not get proteins to where they are needed in our body until 3 p.m. (if we eat lunch). That means from 6 a.m. to 3 p.m. stress is put on our bodies. Stress that could have been prevented by eating a good breakfast.

In eating breakfast, it's important to choose foods that will get our bodies off to a good start. Some cereals are processed grains with many of the nutrients missing--plus many cereals have sugar as a major ingredient which is bad for our teeth and adds calories. Comparing a Mounds Bar, a Ding Dong, and Cap'n Crunch cereal, the cereal has the highest percentage of sugar (over 1/3).



MORE

*Using the food cards and the following Breakfast Food List for ideas, make a list of breakfast foods dividing the list into Good Foods (good for us to eat); Bad Foods (not good for us to eat but have some ok parts); Ugly Foods (very bad for us to eat).

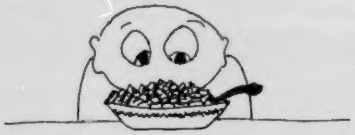
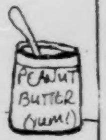
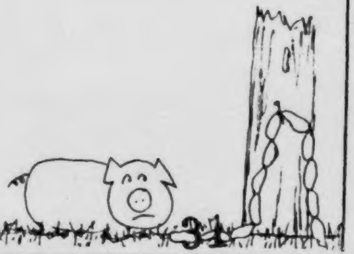
*Use cereal boxes to show examples of food labels and how you can tell if sugar or another sweetener is in the product. (See label reading lesson page 379.)

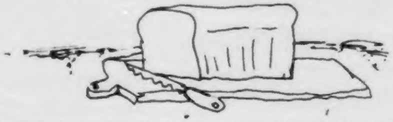
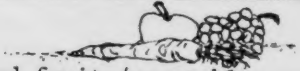
Why is breakfast important to eat? Give two examples of a good breakfast. Give two examples of an ugly breakfast. Compare three differences between a 'good' cereal and an 'ugly' cereal. Name three good breakfasts you like to eat.

Prepare a good breakfast with your class. (See granola recipe page 415).

I LIKE PEANUTBUTTER ON MY EGGS!
MILK
Peanut Butter

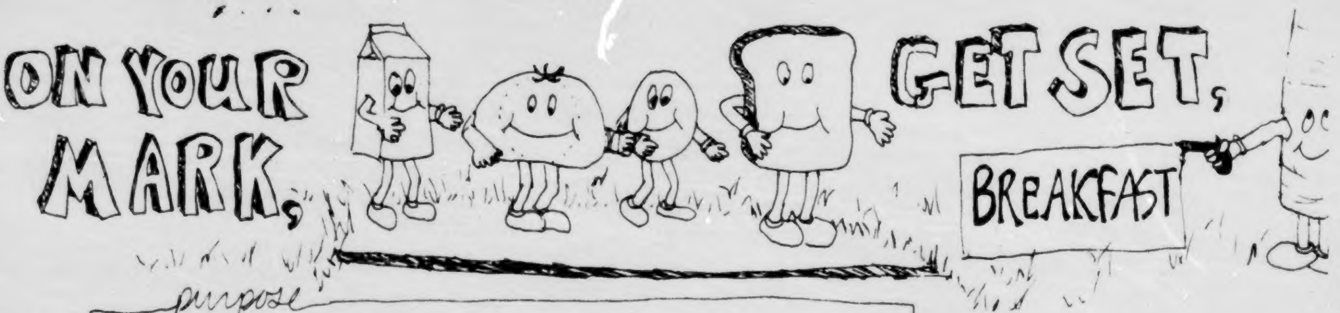
Adapted from the San Jose Nutrition Education Project, San Jose Unified School District.

GOOD (GOOD FOR US TO EAT)	BAD (NOT GOOD FOR US BUT HAVE SOME OK PARTS)	UGLY (VERY BAD FOR US TO EAT)
CEREALS Whole grain cereals have all the nutrients of the grains (not processed)-and little or no sugar. Shredded Wheat Puffed Wheat Granola (some) Grape Nuts Flakes All Bran Team Wheat Chex Grape Nuts 40% Bran Flakes 100% Bran Raisin Bran Oatmeal-good variety of nutrients Hominy grits-good variety of nutrients.	Refined cereals with low sugar content. (Many of the grain nutrients have been processed out) Puffed Rice Post Toasties Rice Chex Corn Flakes Cheerios Corn Chex Rice Krispies 	Presweetened cereals. (These cereals are high in sugar plus use processed grains.) Super Sugar Chex Sugar Frosted Flakes Frosted Mini Wheats Super Sugar Crisp Frankenberry Kaboom Count Chocula Froot Loops Honeycomb Apple Jacks King Vitamin Sugar Pops Cap'n Crunch Crunch Berries Cocoa Puffs Cocoa Krispies Frosted Flakes Baron von Redberry Trix Cocoa Pebbles Fruity Pebbles Sugar Smacks Sugar Frosted Cornflakes
MAIN DISH  Eggs-good protein source. Peanut Butter-high in nutrients especially protein. Cottage cheese-high in nutrients especially protein. Yogurt-high in many nutrients. (Note: fruit flavor yogurts have sugar in them-why not use plain yogurt and add fresh fruit) Whole wheat pancakes-many nutrients; but the extras (butter, syrup) are not good for us. Whole wheat waffles-many nutrients; but the extras (butter, syrup) are not good for us.	White flour pancakes-some nutrients-not many plus the extras (butter, syrup are not good for us.) White flour waffles-some nutrients-not many plus the extras (butter, syrup are not good for us.) Salted peanuts-good in nutrients but salt is bad for our hearts. 	Bacon-very high in fats. Sausage-very high in fats. 

GOOD (GOOD FOR US TO EAT)	BAD (NOT GOOD FOR US BUT HAVE SOME OK PARTS)	UGLY (VERY BAD FOR US TO EAT)
BREADS Whole wheat bread-low in calories variety of nutrients. Corn tortilla-low in calories, variety of nutrients. 	Cornbread-high in calories, but variety of nutrients. Biscuits-variety of nutrients. 	Doughnuts-usually high in sugar and calories. Pastry rolls-usually high in sugar and calories. Bagel-usually high in sugar and calories.
 BEVERAGES Skim milk-many nutrients and not much fat. Lowfat 2% milk -many nutrients and not much fat.	Whole milk-many nutrients but high in fat content. 	Cocoa-nutrients but high in sugar and fat; so very fattening. Chocolate milk-nutrients but high in sugar and fat-so very fattening.
FRUITS AND VEGETABLES Vegetable-fresh-high in vitamins. Fruits-fresh/dried-high in vitamins.	 Canned fruits/vegetables packed in water and natural juices-loses some nutrients in the processing.	Canned fruits/vegetables packed in syrup-loses nutrients in processing and syrup has added sugar.
EXTRAS		Butter-high in fats. Jelly-Usually a lot of sugar.

Students may want to suggest foods that are normally not considered breakfast foods, but that they may want to eat for breakfast.

ON YOUR MARK, GET SET, BREAKFAST



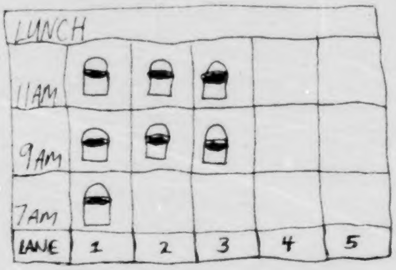
purpose

To reinforce our need to eat a healthy breakfast.

Materials: buckets of water

This lesson will use a 5-lane race to demonstrate how breakfast helps us through the day. It is a good follow up to The Good, The Bad, and The Ugly.

On a blacktop area mark off the racing lanes. Create 5 lanes and mark time lines across the lanes like this:



LUNCH					
11AM	🪣	🪣	🪣		
9AM	🪣	🪣	🪣		
7AM	🪣				
LANE	1	2	3	4	5

Place a bucket of water where there are 🪣's.

Have students perform a 5-lane race to demonstrate how breakfast helps them through the day. Students who are in lanes with healthy breakfasts will have no trouble making it to lunchtime. Students who are in lanes with no breakfast, or sugar breakfast will have to pick up buckets of water as they move toward lunchtime. The water represents the added stress they carry by not eating a healthy breakfast. (You may want to substitute buckets of water with plastic gallon jugs filled with water, or other heavy material.)

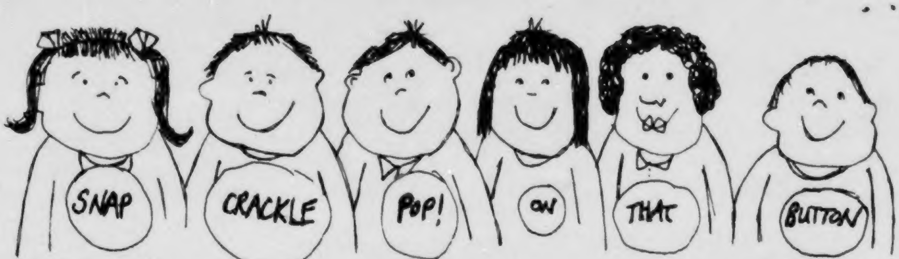
*'Feed' each child breakfast and let all students know the different breakfasts being served.
Lane 1: eats no breakfast at all
Lane 2: eats two doughnuts
Lane 3: eats Super Sugar Crisp (a real cereal product)
Lane 4: eats a whole grain cereal (oatmeal)
Lane 5: eats two eggs, whole wheat toast, and milk

*After all finish breakfast, each student starts down his/her lane picking up any buckets that are in the lane. Each bucket is carried all the way to lunchtime. (Thus it will be very difficult for the person with no breakfast to reach lunchtime, since s/he will be carrying three buckets.)

*The goal is to reach lunchtime with plenty of energy and little stress.

Why did Lane 1 have the most difficult time getting to lunch? Why was it easy for some people to get to lunch and more difficult for others? What kinds of foods will you eat for breakfast?

2011


SNAP
CRACKLE
POP!
ON
THAT
BUTTON

purpose

To reinforce the importance of eating breakfast.

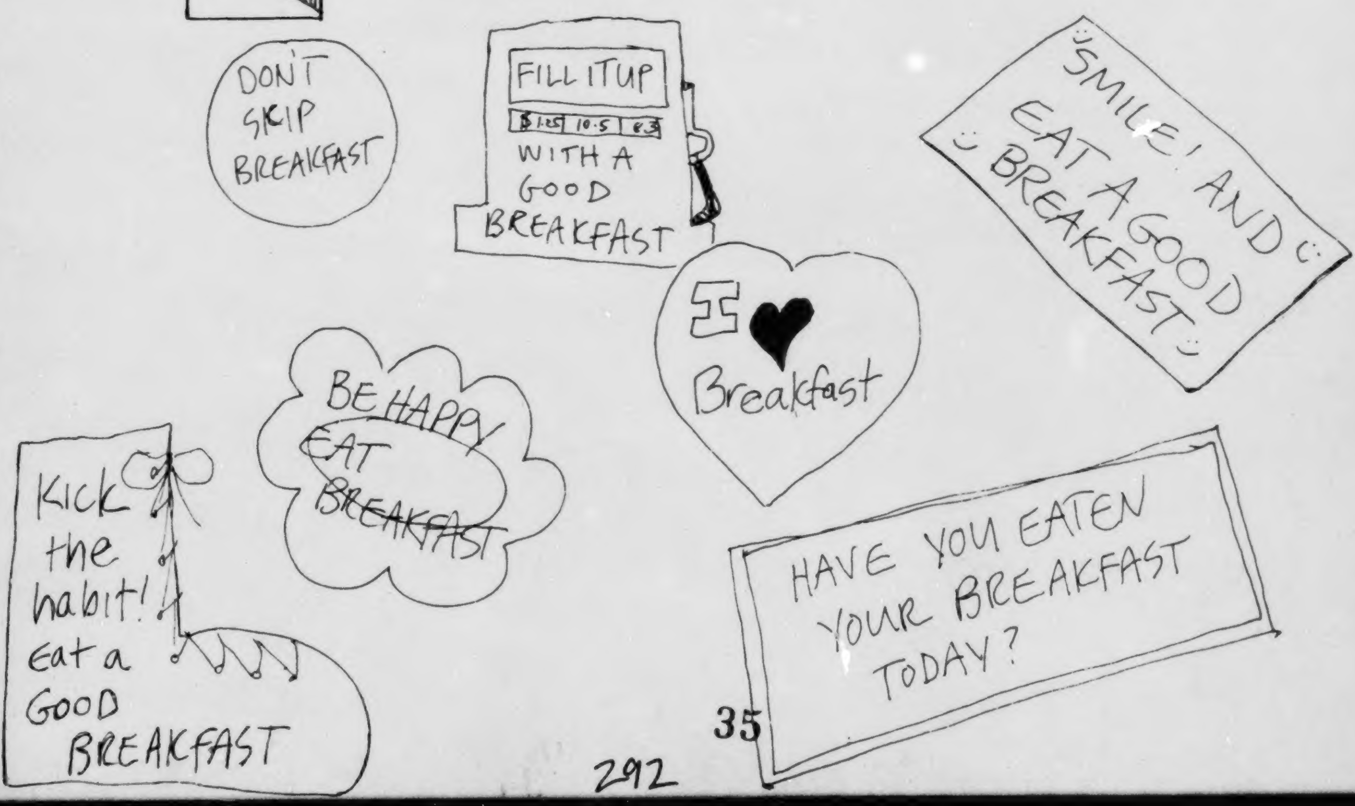
Materials: Posterboard or cardboard and safety pins/or button-making machine and appropriate materials. Color markers.

This lesson uses art to reinforce the importance of eating breakfast. It is a good follow-up to the Good, Bad, and Ugly. Students will make their own 'Breakfast Button' that has a message relating to breakfast: 'I 8 breakfast 2day';'Breakfast is Good for Me,' etc.

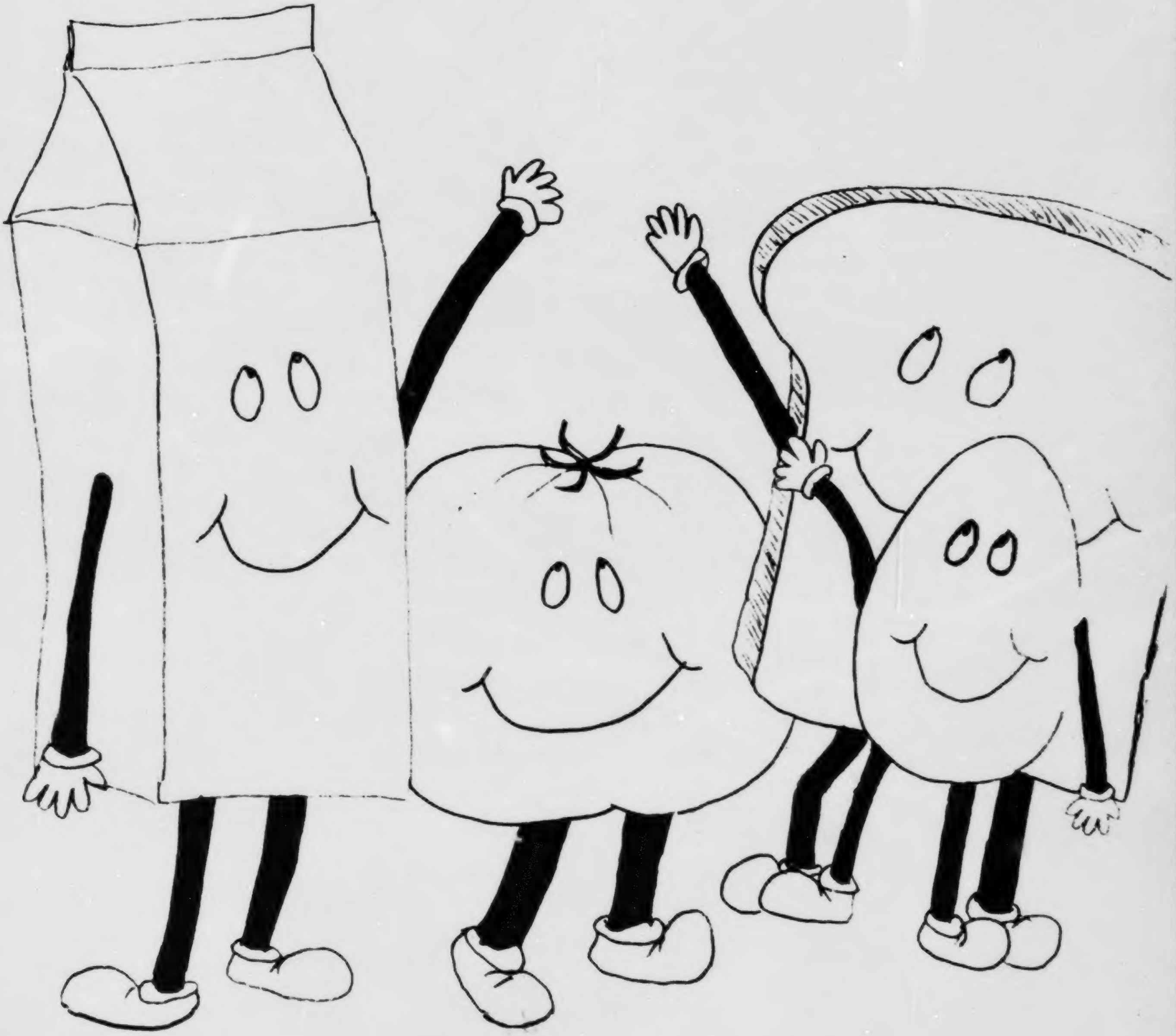
*Have students make breakfast buttons. Cut posterboard to button-wearing size. Have students write a breakfast message on button and decorate it. Back the button with a safety pin or mount and seal with button making machine.

*Then start a Breakfast Button Box in the classroom. When a student eats breakfast he/she can put on a button when they come into class.

Describe what your button message means to you. Why is breakfast important to eat?


DON'T SKIP BREAKFAST
FILL IT UP
$1.25 10.5 8.3
WITH A GOOD BREAKFAST
SMILE! AND EAT A GOOD BREAKFAST
I ♥ Breakfast
BE HAPPY EAT BREAKFAST
Kick the habit! Eat a GOOD BREAKFAST
HAVE YOU EATEN YOUR BREAKFAST TODAY?

Basic 4



The Basic Four Food groups provide a simple guideline for determining if meals contain the necessary nutrients. This unit introduces the Basic 4 with modifications. Foods high in salt, sugar, and fat, although in a food group, are detrimental to our health.

These lessons develop the students ability to identify foods in their appropriate groups, analyze the quality of their own eating and synthesize this information into planning balanced meals for others.

The Basic 4 unit is taught to our third grade classes, and is an important unit to review for all students.

Lesson Titles	Recommended Grade Levels
The Fabulous Familar 4	2 - 5
Good For Me Plan	3 - 6
Searching For The Terrible Three	3 - 6
Dear Diary	4 - 6
Food Planners	3 - 6

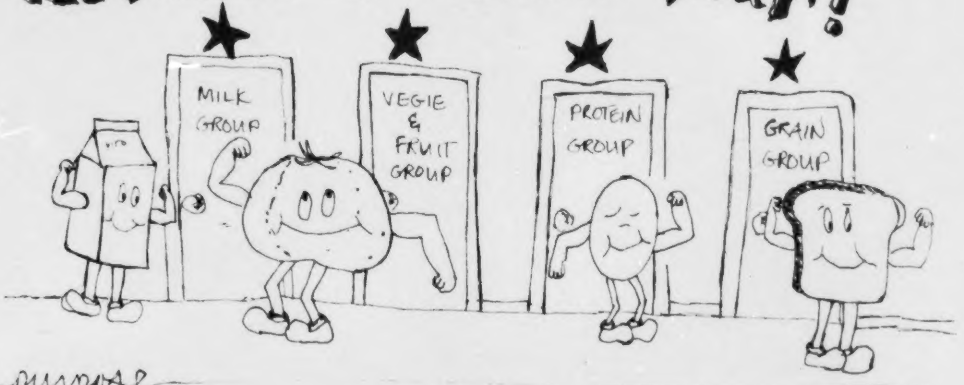
Special Materials & Where To Find

Food Cards - A set of laminated food pictures with nutritional information on reverse side (used for many lessons).

Order from - National Dairy Council, 6300 North River Road, Rosemont, IL 60018. #B012B Food Models - $6.00.

*The above material is listed to assist you in locating it. All materials are listed with each lesson and most are readily available.

The Fabulous Familiar Four!



purpose

To introduce the basic food groups as guidelines for healthy eating.

Materials: Food pictures* representing the four groups plus extra foods; poster board (labeled and divided into each food group and its function).

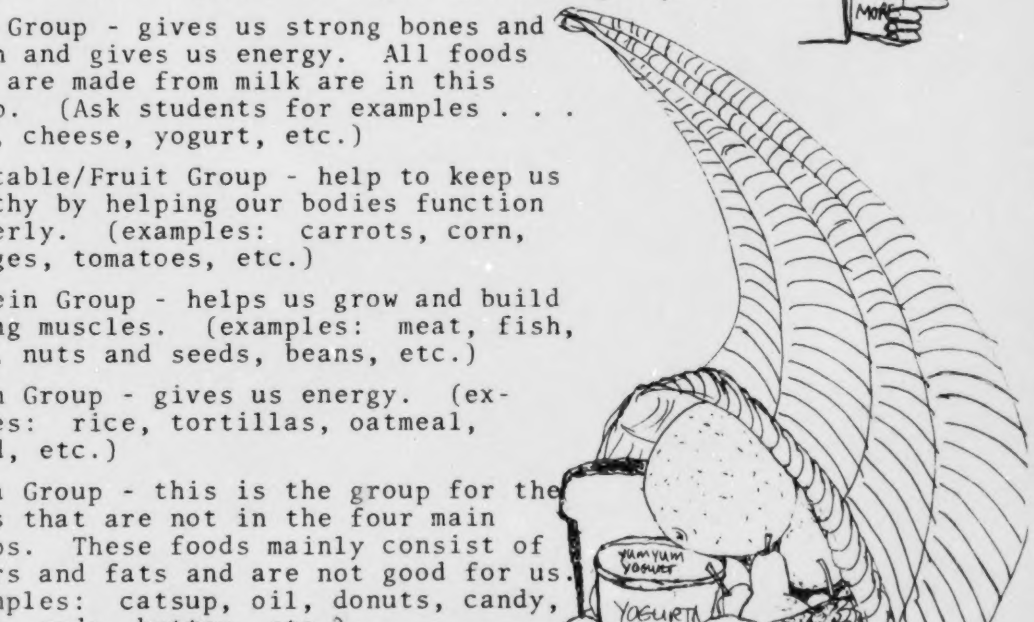
ACTION

In this lesson students will learn the Basic Four groups and identify and classify foods into these groups.

*Discuss with students why we need food and how we can discover whether we are eating a variety of foods that will give our bodies what they need. Food gives us energy, helps us grow, and keeps us healthy. We need to eat a variety of foods for our bodies to get all that we need. Food scientists have divided food into food groups as a way for us to know if we're eating the variety of foods that we need. There are four main food groups:

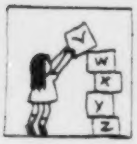
1) Milk Group - gives us strong bones and teeth and gives us energy. All foods that are made from milk are in this group. (Ask students for examples . . . milk, cheese, yogurt, etc.)
2) Vegetable/Fruit Group - help to keep us healthy by helping our bodies function properly. (examples: carrots, corn, oranges, tomatoes, etc.)
3) Protein Group - helps us grow and build strong muscles. (examples: meat, fish, eggs, nuts and seeds, beans, etc.)
4) Grain Group - gives us energy. (examples: rice, tortillas, oatmeal, bread, etc.)
5) Extra Group - this is the group for the foods that are not in the four main groups. These foods mainly consist of sugars and fats and are not good for us. (examples: catsup, oil, donuts, candy, cakes, soda, butter, etc.)

MORE

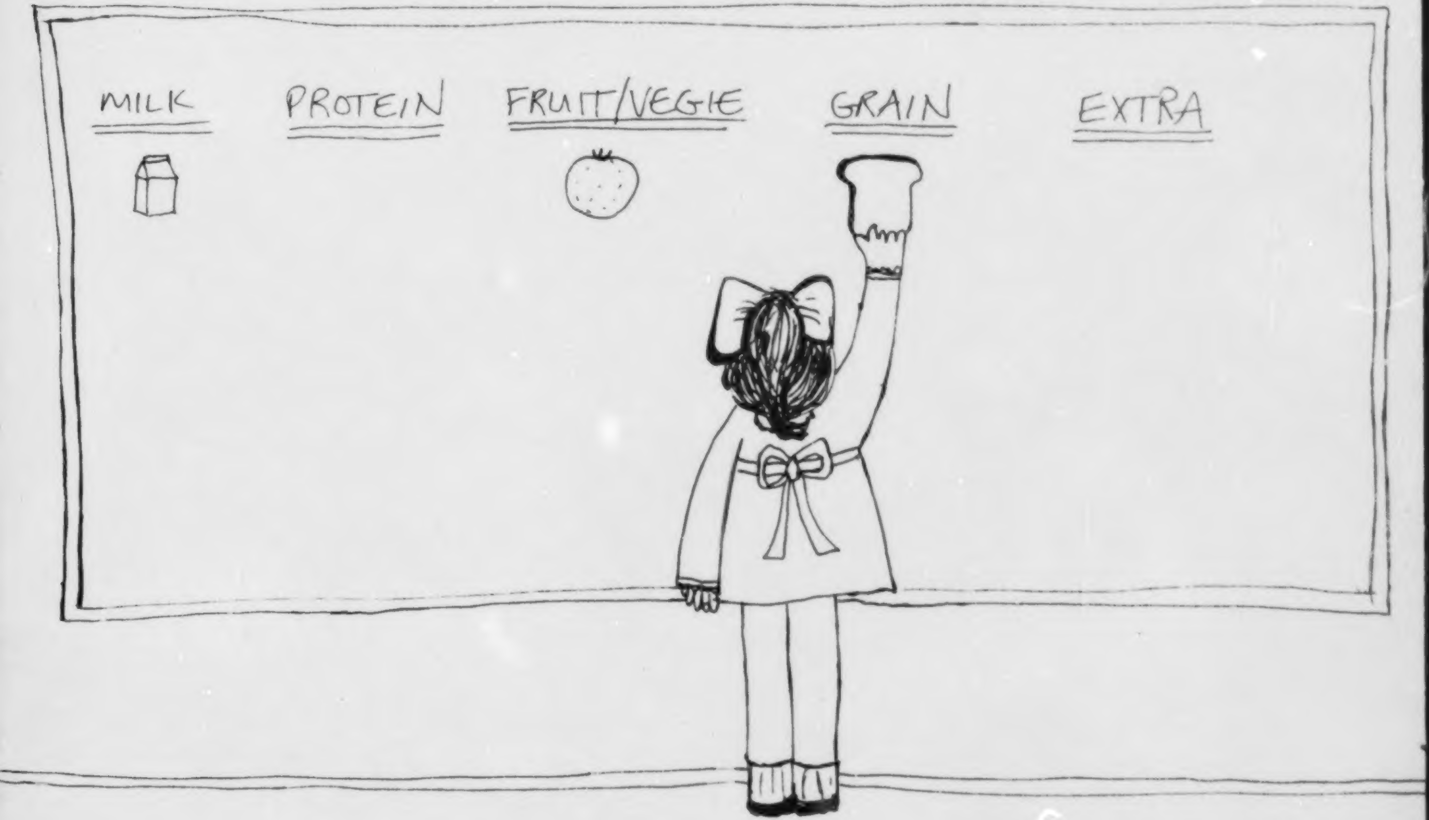


*Have students place food pictures into proper food categories on poster board. (By placing velcro on poster and pictures, students will be able to stick pictures on board.)

How can we use food groups? What food groups give us energy? growth? keep us healthy? Name your favorite food in each food group.



Make a class graph of the favorite foods in each food group. Send it to the cafeteria staff so they can know the students preferences.



Good For Me Plan

purpose

To use the Basic Four food groups in planning a balanced meal.

Materials: meal chart (p. 298), pencil

In this lesson students will use the meal chart to devise one day's balanced meals. A balanced meal will provide all of the nutrients our bodies need to give us energy, stay healthy, and help us grow. We need the following servings per day:

Milk group - Three servings
Vegetable/Fruit group - Four servings
Protein group - Two servings
Grain group - Four servings

*Discuss with students examples of balanced meals they have eaten.

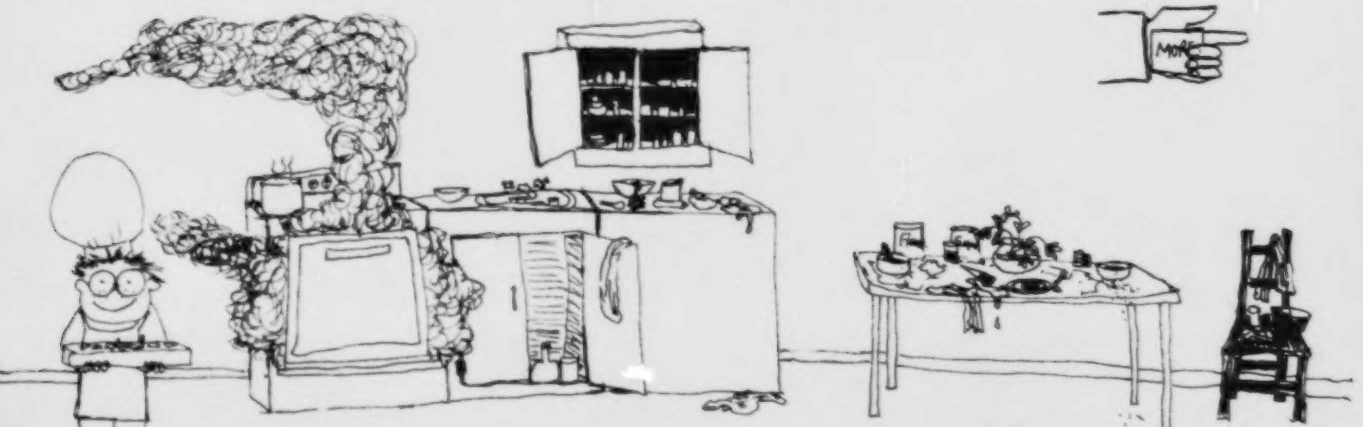
*Divide students into small groups and have each group devise one day's worth of meals; or have each group do one meal and then share meal plans.

Would you eat the meals you planned? What makes a balanced meal? Why is it important to eat balanced meals? What are you going to do to make sure your meals are balanced?

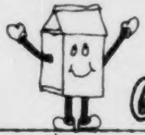
*Have students keep a three-day record of what they eat. Have them analyze their recordings to see if they eat balanced meals.

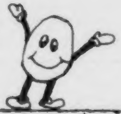
*Prepare a balanced meal with your class. See recipes for granola, p.415; peanut butter and banana sandwich p.417; garden salad delight p.418.

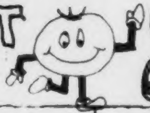
MORE



Meal Chart







	MILK GROUP	PROTEIN GROUP	VEGI/FRUIT GROUP	GRAIN GROUP	EXTRA GROUP
BREAKFAST					
LUNCH					
DINNER					
SNACK					

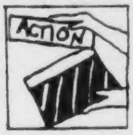
REMEMBER: We need 3 servings from the Milk group; 4 servings from the vegetable/fruit group; 2 servings from the protein group; 4 servings from the grain group. We do not need foods from the Extra Food Group.

Searching For....
The Terrible Three

INGREDIENTS
tasty treats
naughty bits
yucky yums

To demonstrate that foods with added sugar, salt, or high fat content are dangerous for our health.

Materials: a set of Fortitude Cards (p 301-312) for each student

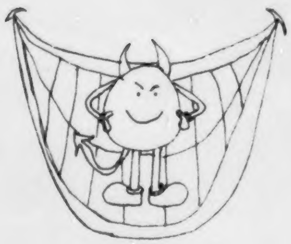


In this lesson students will use critical thinking and math skills to plan a nutritious Basic Four meal.

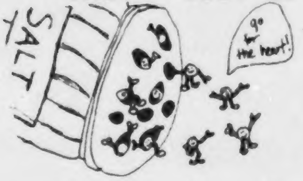
The Basic Four Food Guide provides a simple approach to checking whether or not we get the essential nutrients we need. However, this simplification allows for foods to be included in the groups that are actually dangerous to our health.

*Discuss with students the three ingredients that can be dangerous when consumed in large amounts:

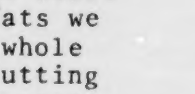
SUGAR - Americans eat three times as much sugar as they did 100 years ago. Sugar is added to many of the canned and packaged foods we buy. But eating a lot of sugar may cause tooth decay; obesity; heart disease; vitamin deficiencies and diabetes. When we eat sugar it is quickly used up by our bodies giving us a rush of energy that makes us feel very tired as soon as it is gone (sugar crash). Sugar gives us 'empty calories'--not providing any vitamins, minerals or protein to our bodies. Next time you're ready to bite into a cookie, or drink some soda pop--think about it.



SALT - Salt is a mineral made up of two elements; sodium and chloride. Sodium is also found in many food additives. (Check those labels!) A high sodium diet can lead to high blood pressure which is a main cause of heart disease. Salt is added to many packaged goods. Do you know anyone who puts a lot of salt on their food?



FATS - Some fat is necessary in our diet. It contains nutrients we need, helps us digest certain vitamins, is an excellent source of energy and adds flavor to meals. However too much fat can make us overweight and can be a major contributor to heart disease. We can reduce the amount of fats we eat by: drinking skim milk instead of whole milk; not eating hot dogs or bologna; cutting off as much excess fat as possible from meat before and after cooking.



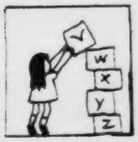
*Have students play "Forty Points to Fortitude"

Game Objective - to put together a balanced meal that adds up to 40 points.

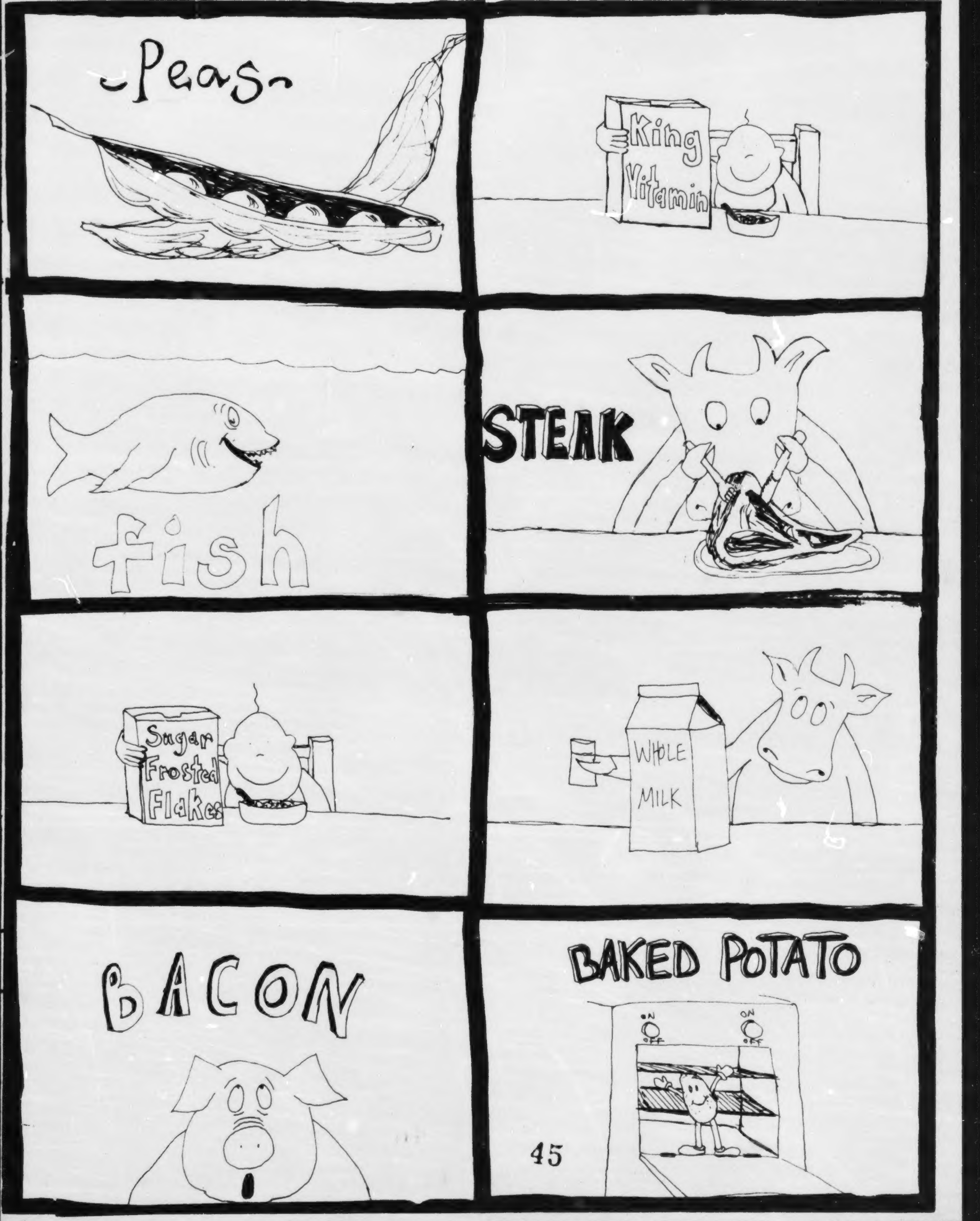
Rules:
1. Give each student a set of Fortitude Cards (p.277-288).
2. Have them keep cards face up. Do not look at backs.
3. Have them plan a meal with cards that is balanced and low in sugar, salt, and fats.
4. To check their work have them turn the card over. They should have a food from each food group; and their meal should add up to 40 points. Scoring on the cards gives nutritious foods 10 points and foods with sugar, salt, or fats -10.
5. Variation on the game: Have students choose foods they eat often. What is their score?

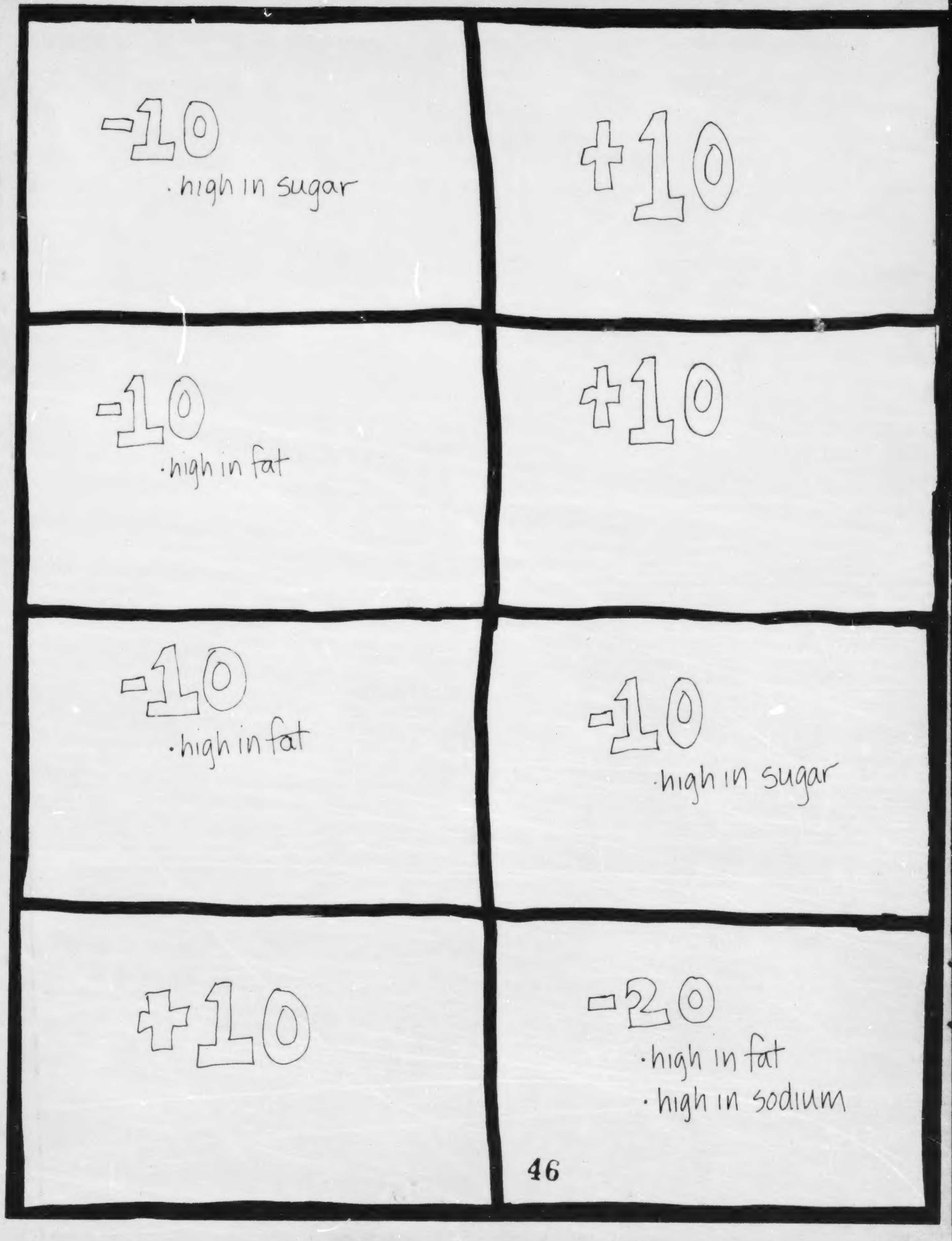
*Discuss how we can tell if the Terrible Three are in foods. It is important to read labels on all packaged goods. Ingredients are listed in order of their percentage by weight in the product.

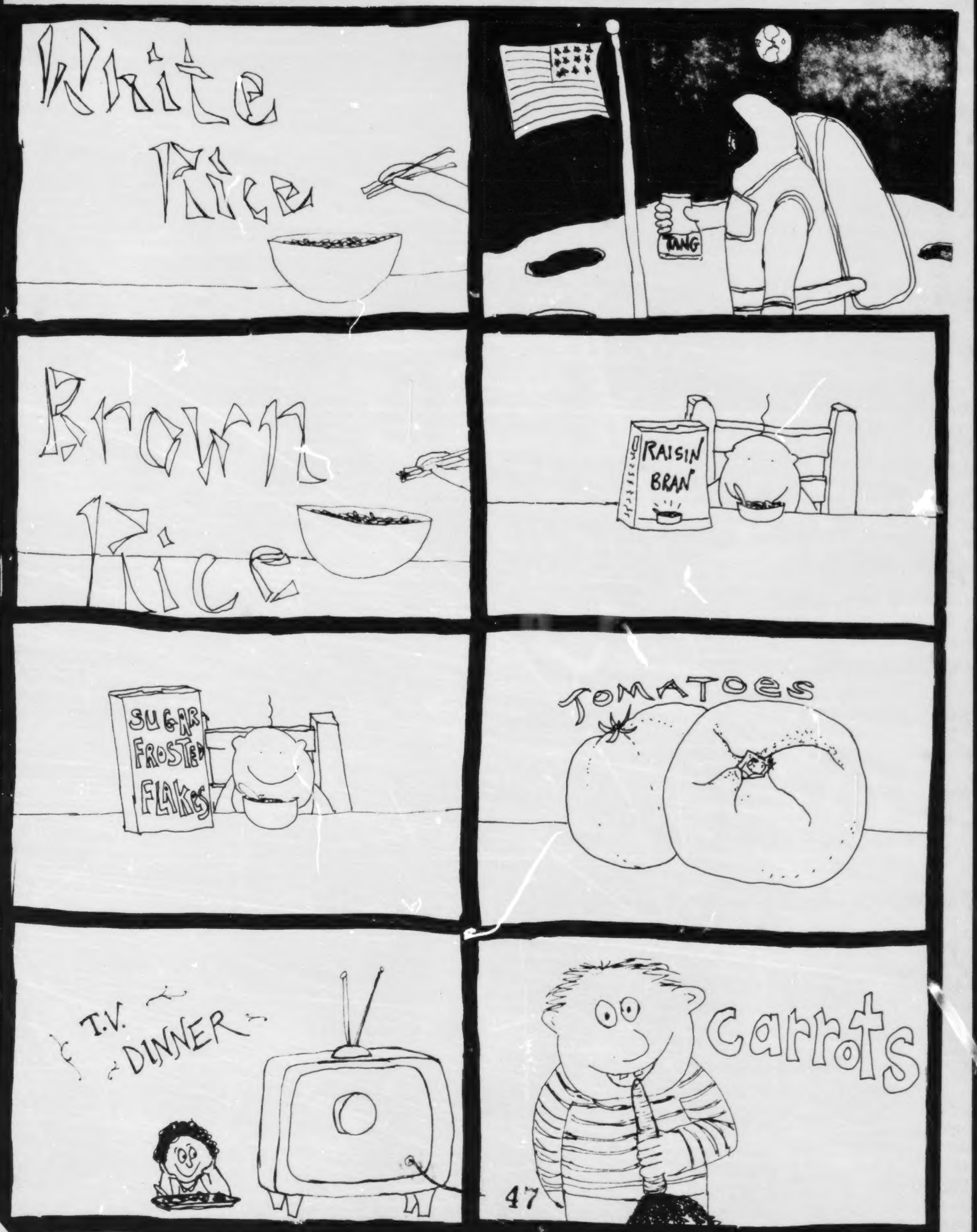
What are three ingredients in food that are dangerous for our health? How can you tell if any of these ingredients are in a food? Name two ways you could make your diet healthier. Predict what would happen if you ate a candy bar everytime you had a snack.

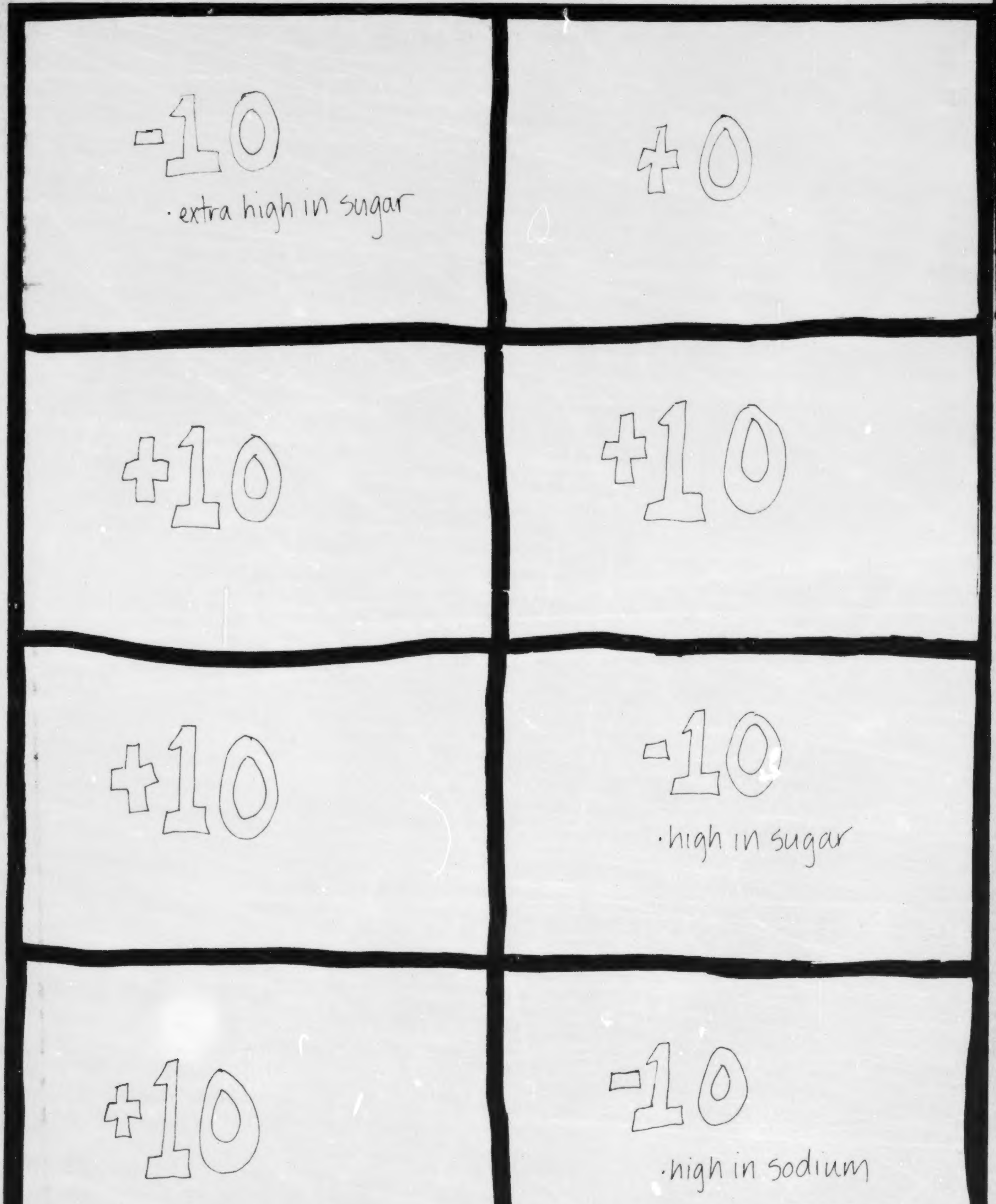


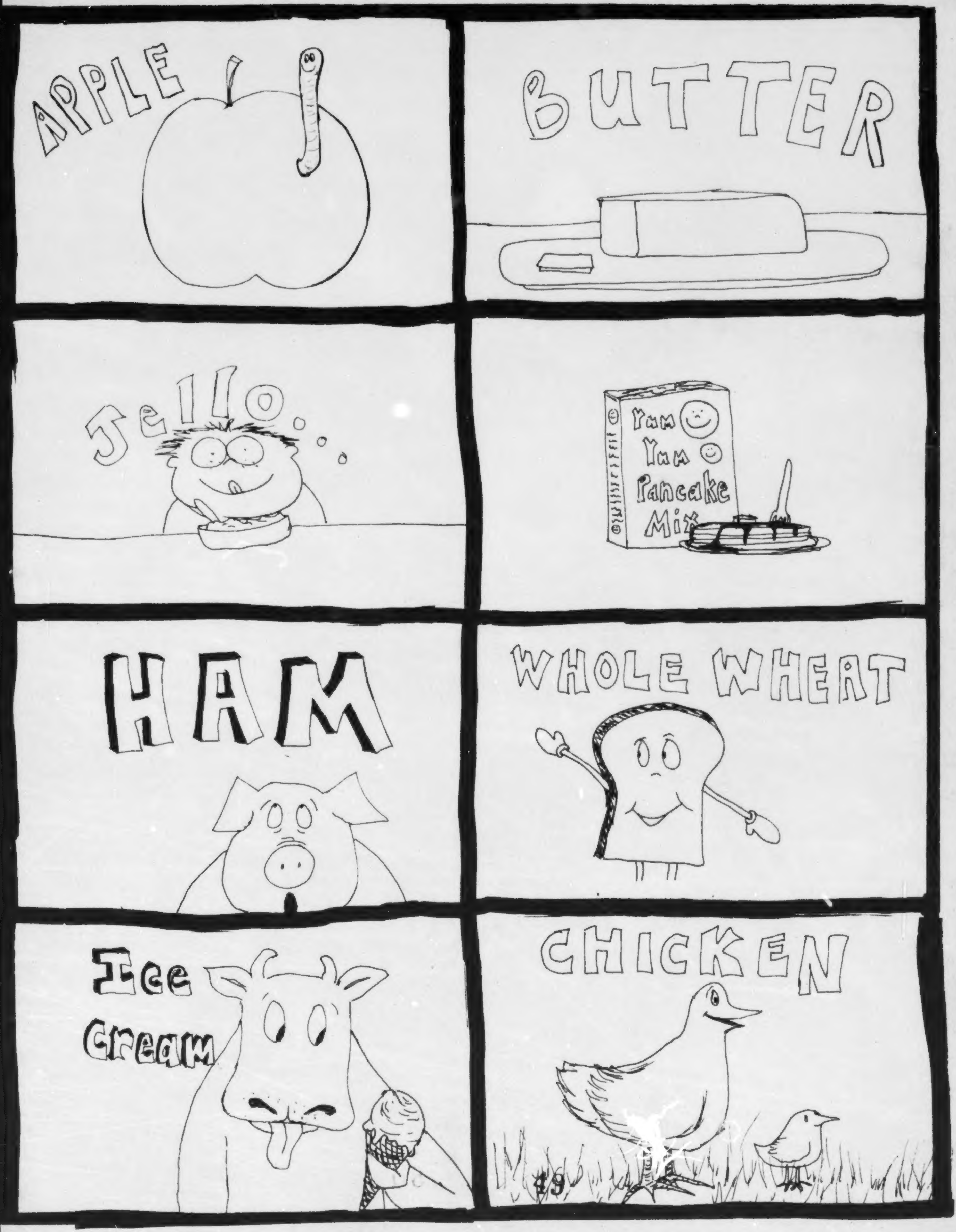
Have students bring in labels from foods they eat at home. Circle any of the terrible three that are ingredients. Are those foods nutritious or dangerous?


-Peas-
King Vitamin
fish
STEAK
Sugar Frosted Flakes
WHOLE MILK
BACON
BAKED POTATO
ON
OFF
ON
OFF

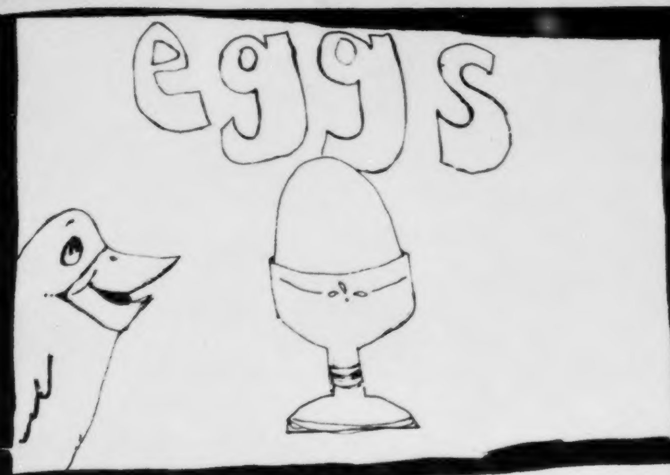

-10
· high in sugar
+10
-10
· high in fat
+10
-10
· high in fat
-10
· high in sugar
+10
-20
· high in fat
· high in sodium

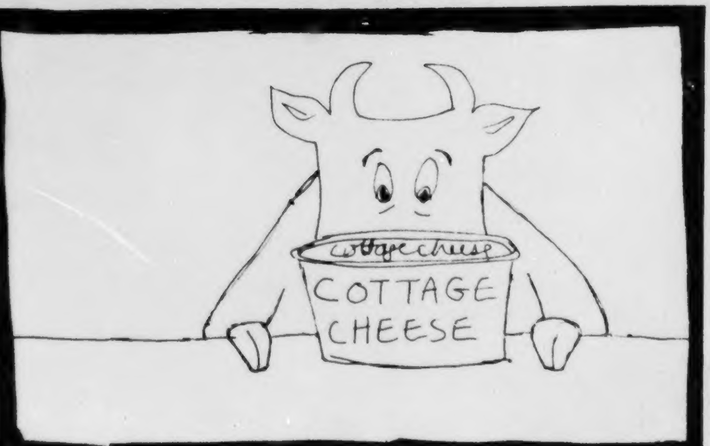

White Rice
TANG
Brown Rice
RAISIN BRAN
SUGAR FROSTED FLAKES
TOMATOES
T.V. DINNER
Carrots

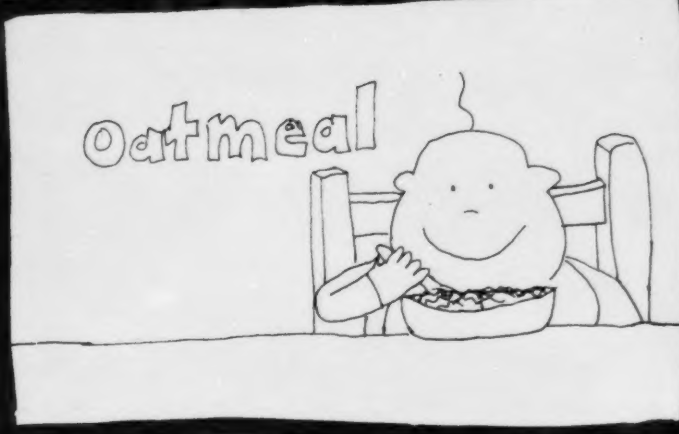

-10
·extra high in sugar
+0
+10
+10
+10
-10
·high in sugar
+10
-10
·high in sodium

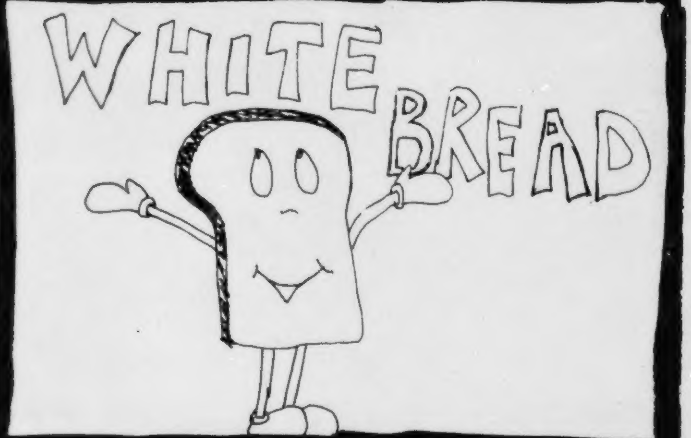

APPLE
BUTTER
Jello
Yum Yum Pancake Mix
HAM
WHOLE WHEAT
Ice Cream
CHICKEN

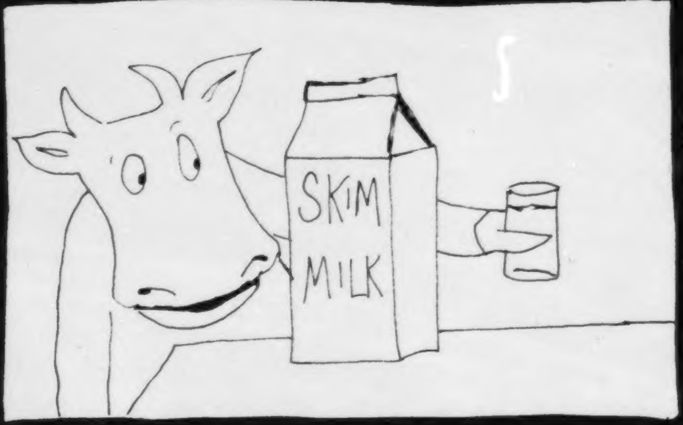
-10 · high in fat	+10
-10 · high in sodium	-10 · extra high in sugar
+10	-20 · high in fat · high in sodium
+10	-20 · high in sugar · high in fat

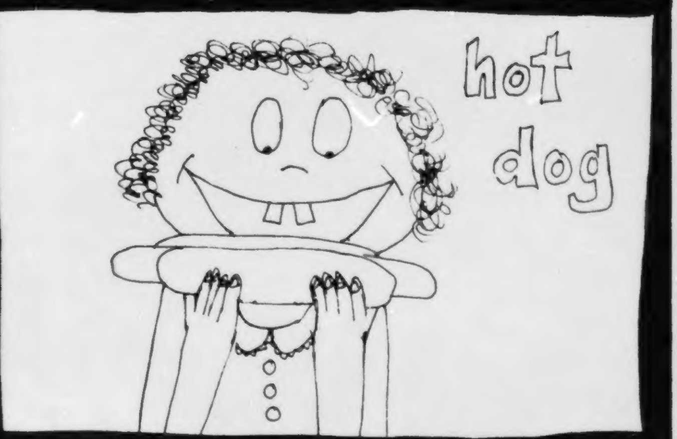

eggs

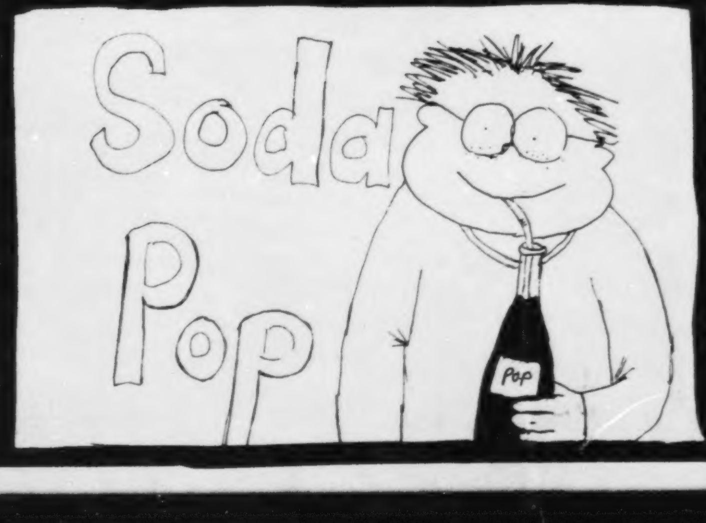

cottage cheese
COTTAGE CHEESE

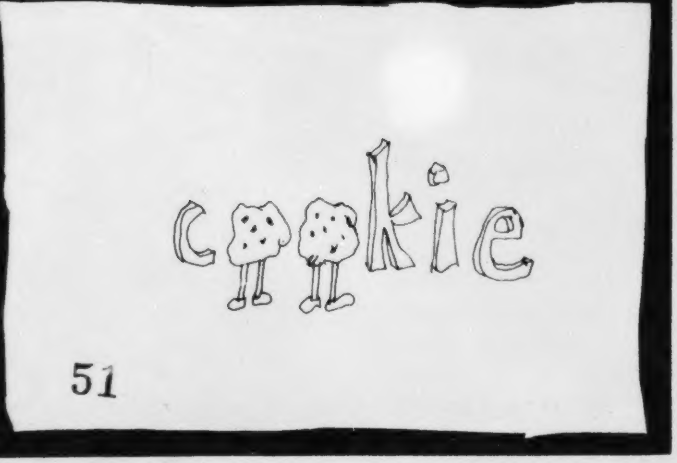

oatmeal

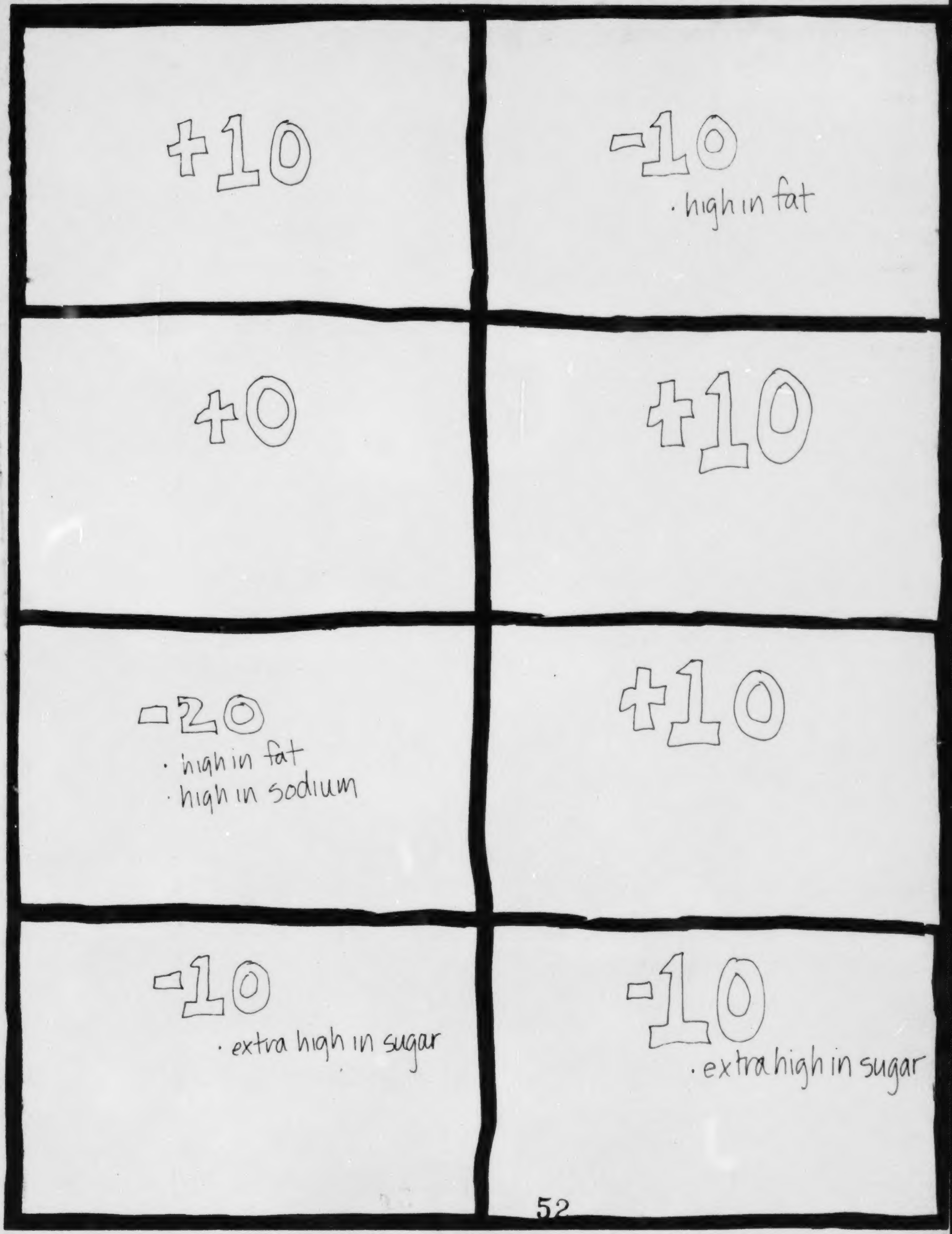

WHITE BREAD

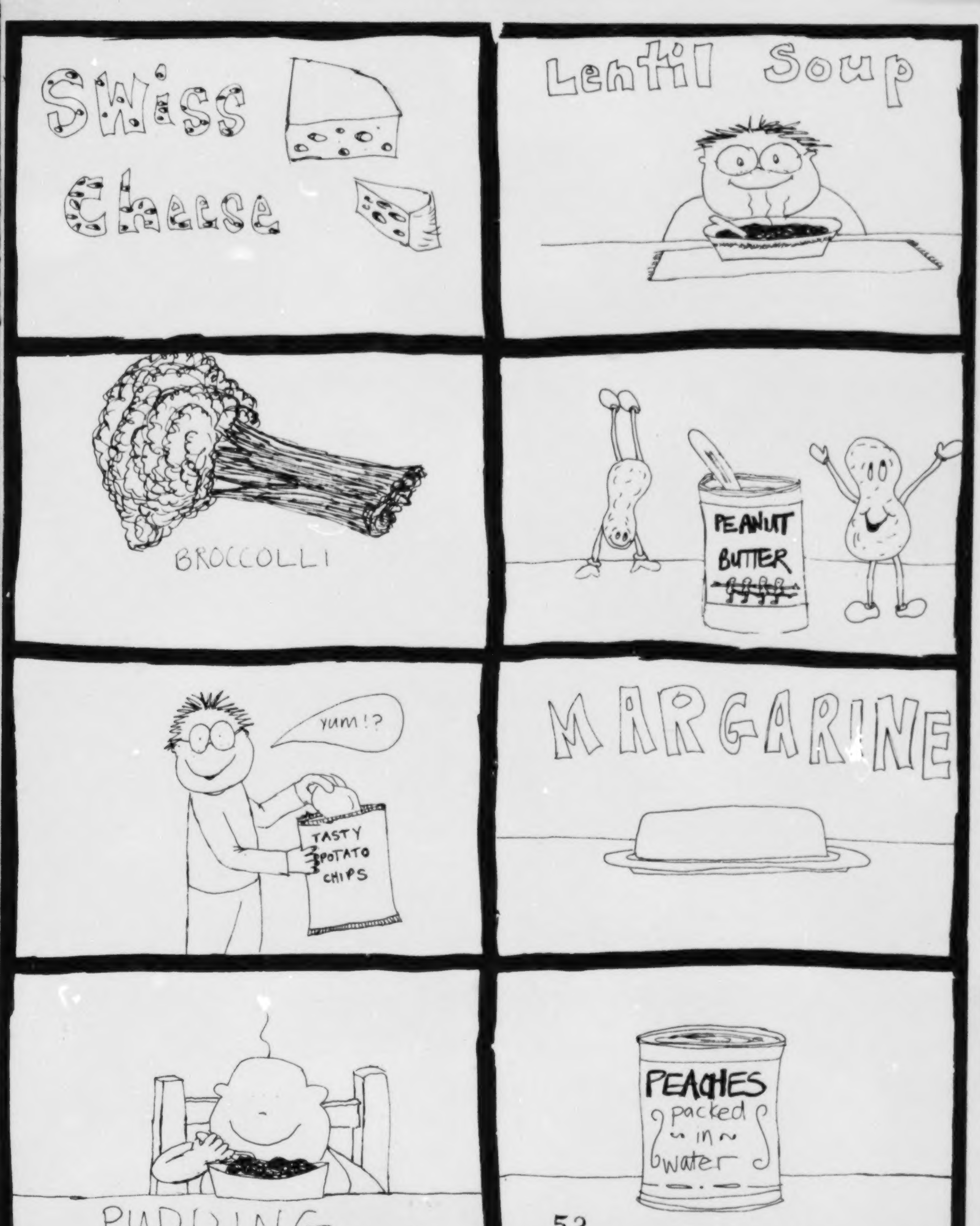

SKIM MILK


hot dog


Soda Pop
Pop


cookie


+10
-10
· high in fat
+0
+10
-20
· high in fat
· high in sodium
+10
-10
· extra high in sugar
-10
· extra high in sugar

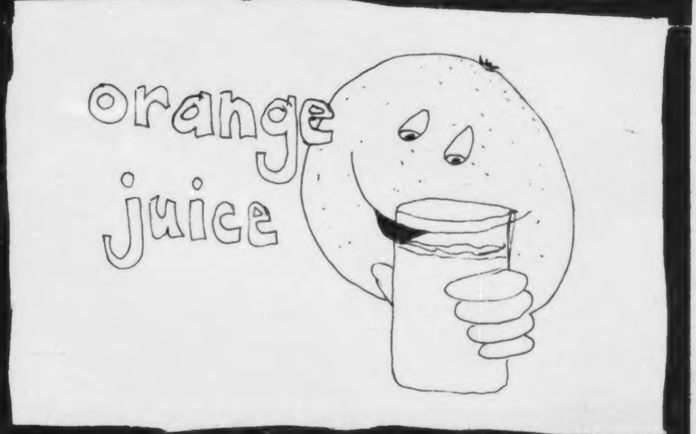

Swiss Cheese
Lentil Soup
BROCCOLLI
PEANUT BUTTER
yum!?
TASTY POTATO CHIPS
MARGARINE
PUDDING
PEACHES packed in water

+10	-10 ·high in fat
+10	+10
-10 ·high in fat	-10 ·high in fat
+0	-10 ·extra high in sugar

Lo-Fat
Yogurt

CANNED PEACHES IN SYRUP
CANNED PEACHES IN SYRUP

SWEETENED
APPLE
SAUCE

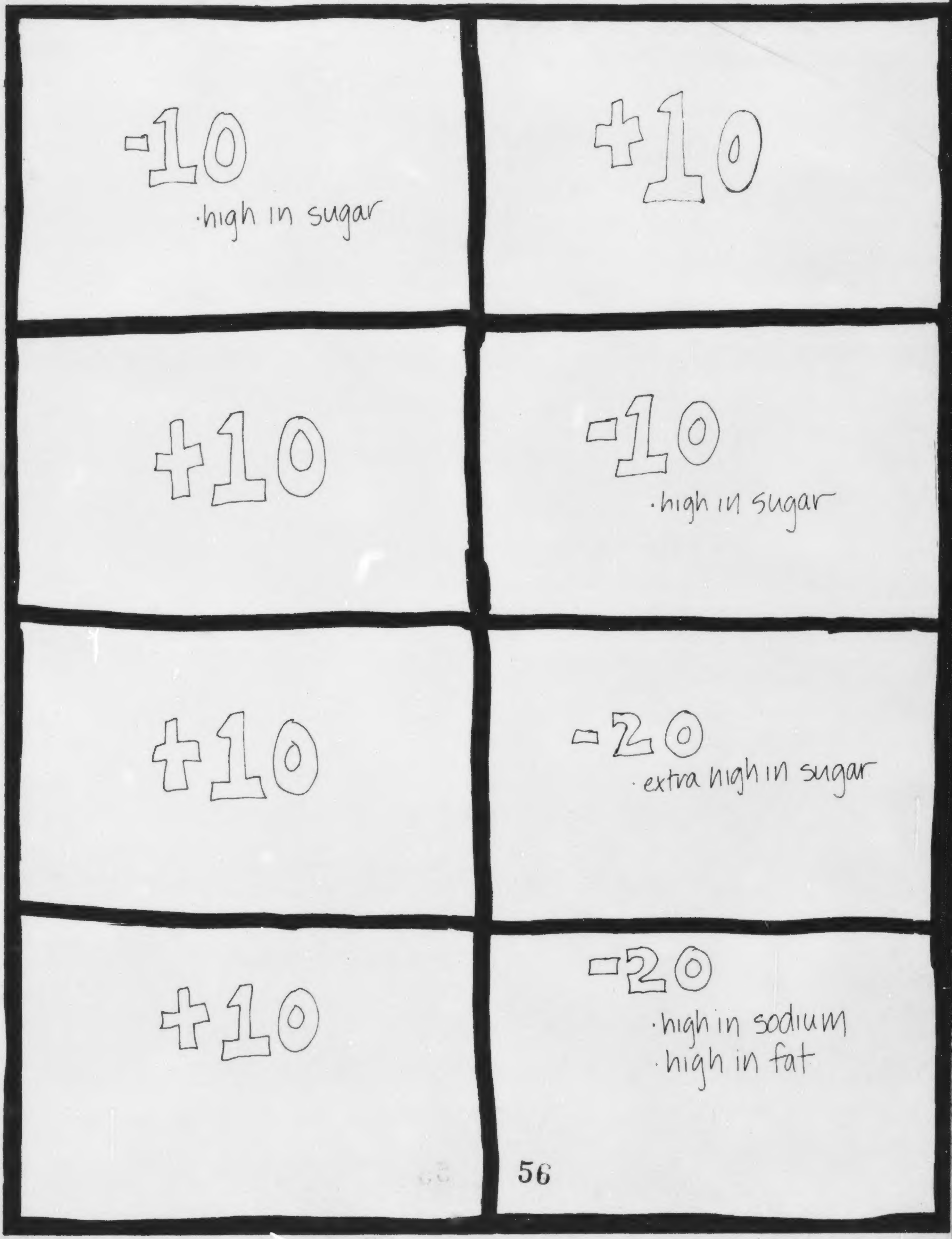

orange
juice

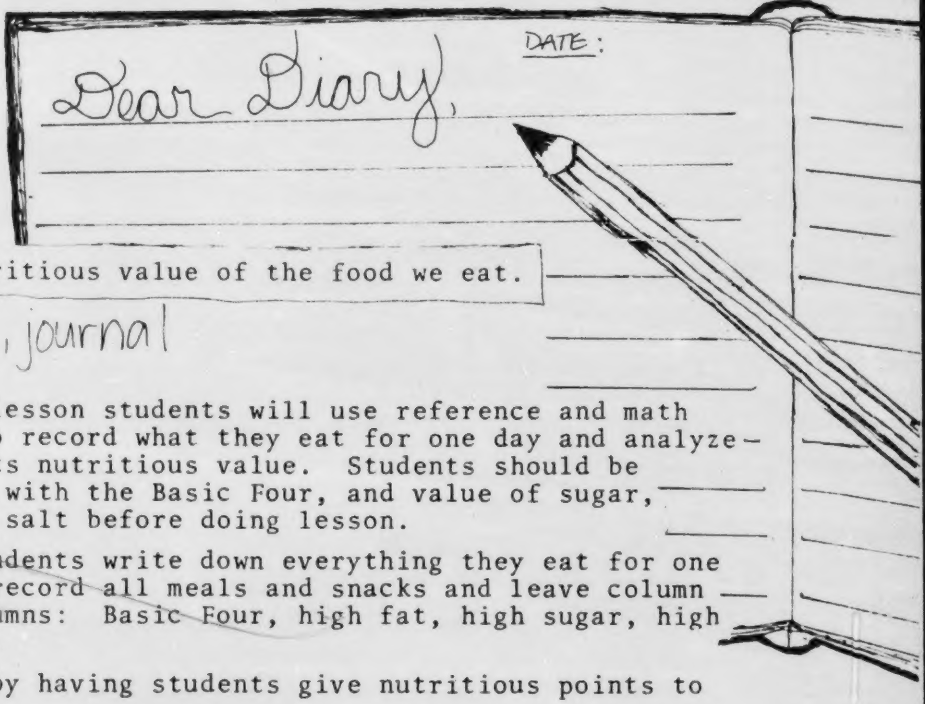
CHOCOLATE
Milk

SALAD
A-1 DRESSING

SMITH-JONES
BOLOGNA
SLICES
PATENT. #67023481 NET WT 2oz

SOYBEANS


-10
·high in sugar
+10
+10
-10
·high in sugar
+10
-20
·extra high in sugar
+10
-20
·high in sodium
·high in fat



purpose

To analyze the nutritious value of the food we eat.

Materials: pencil, journal

In this lesson students will use reference and math skills to record what they eat for one day and analyze it for its nutritious value. Students should be familiar with the Basic Four, and value of sugar, fats and salt before doing lesson.

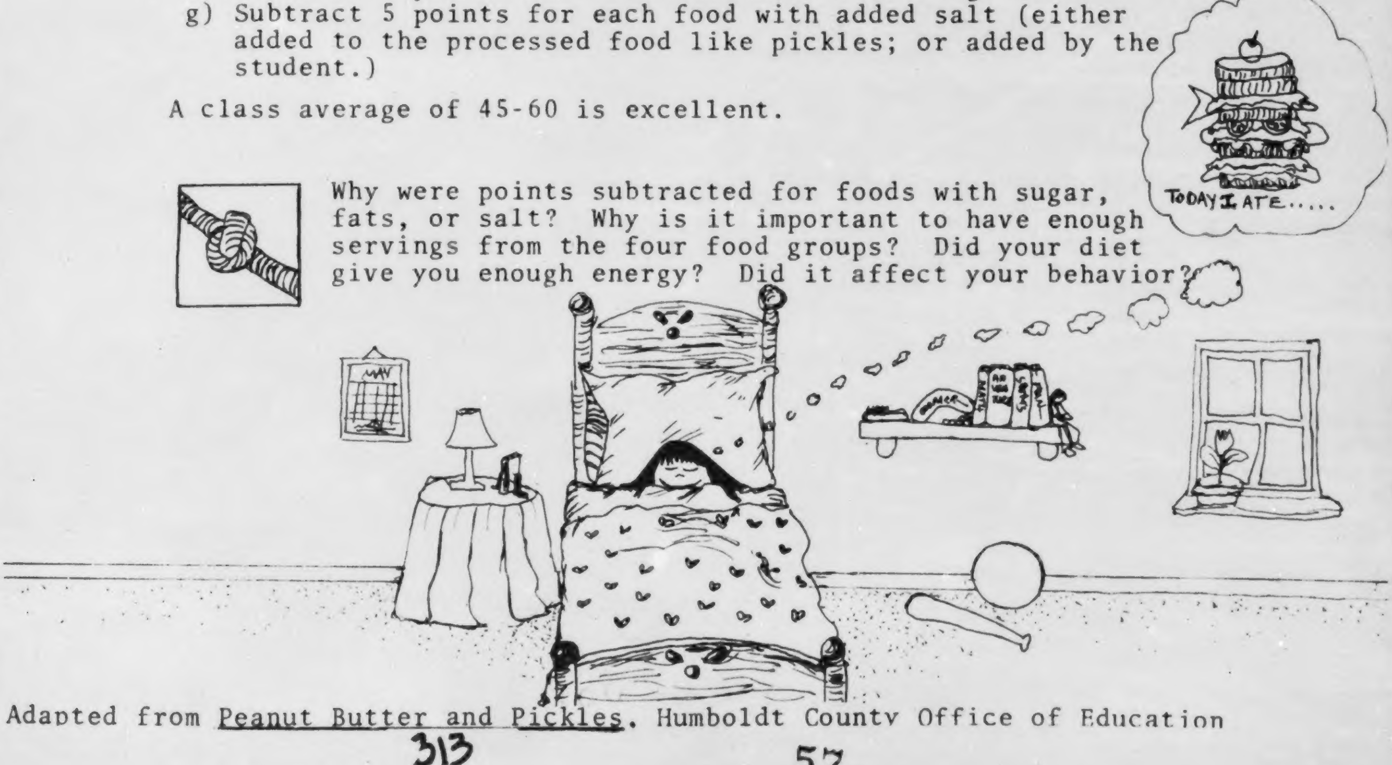
*Have students write down everything they eat for one day. They should record all meals and snacks and leave column space for five columns: Basic Four, high fat, high sugar, high sodium, and points.

*Analyze the food by having students give nutritious points to their diaries:

a) 25 points for eating 100% of Basic Four (two servings of protein; four servings of fruit/vegetable; four servings of grain; three servings of milk.
b) 5 points for each vegetable. Add 1 point if fresh (unprocessed) and another point if eaten raw.
c) 5 points for each protein food. Add 2 points for non-meat protein foods.
d) Allow 5 points for each serving of grains or bread. Add 2 points for whole wheat grain products.
e) Subtract 5 points for each food high in fat/calories (processed meats, pastries, fried food).
f) Subtract 5 points for each food with added sugar.
g) Subtract 5 points for each food with added salt (either added to the processed food like pickles; or added by the student.)

A class average of 45-60 is excellent.

Why were points subtracted for foods with sugar, fats, or salt? Why is it important to have enough servings from the four food groups? Did your diet give you enough energy? Did it affect your behavior?



Adapted from Peanut Butter and Pickles, Humboldt County Office of Education

313

Food Planners

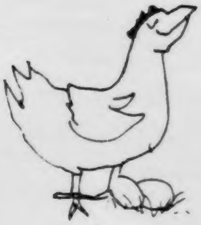
I think chicken goes with eggs
NO. SILLY! CHICKEN GOES WITH RICE!
I think chickens and roosters make a cute pair!

purpose

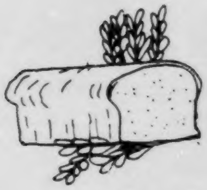
To reinforce the concept of balanced meals.

Materials: pencils, [illegible]

Students will use the guidelines for school lunches to plan a lunch menu that can be used by the cafeteria. The U. S. Department of Agriculture establishes specific guidelines that must be used in planning school lunches. They are:

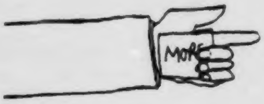


Protein Source (choice of 1)	lean meat, poultry, fish, cheese, large eggs, cooked dry beans or peas, peanut butter
Vegetable/Fruit	Two or more servings of vegetable or fruit
Bread or Bread Alternate	One slice of whole grain or enriched bread, whole-grain or enriched biscuit, roll, muffin, cup of cooked whole-grain or enriched rice, macaroni, noodles, whole-grain or enriched pasta, or other cereal grains such as bulgar or corn grits, or a combination of any of the above
Milk	Serving of milk



*Discuss with students what factors should be considered in planning a menu. (Nutritious, how food prepared, low-cost, tasty, easy to serve, looks appetizing.)

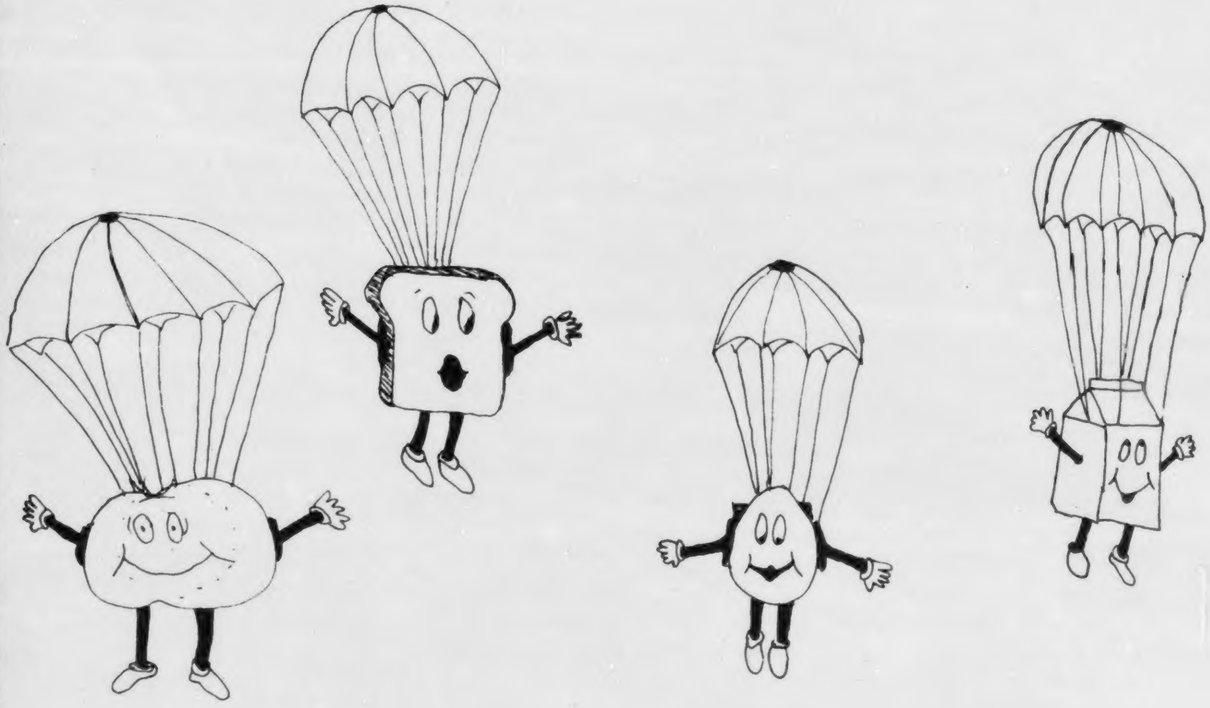
*Considering the factors above and the school lunch guidelines, plan a lunch menu that you would like to see served in the cafeteria. Then send the menu to the cafeteria and ask them to prepare it for the school lunch. Remember to consider how you want the foods prepared. (Fresh vegetables served raw, or steamed, etc./ baked chicken without batter.)

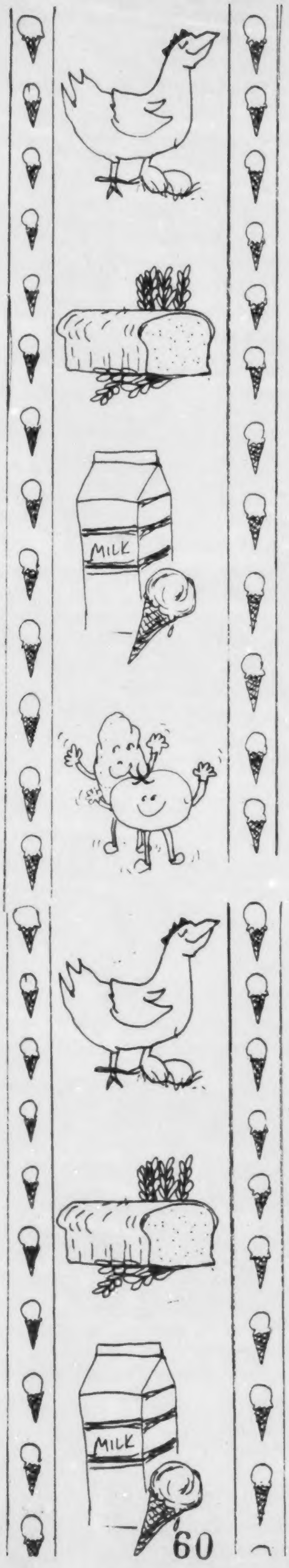


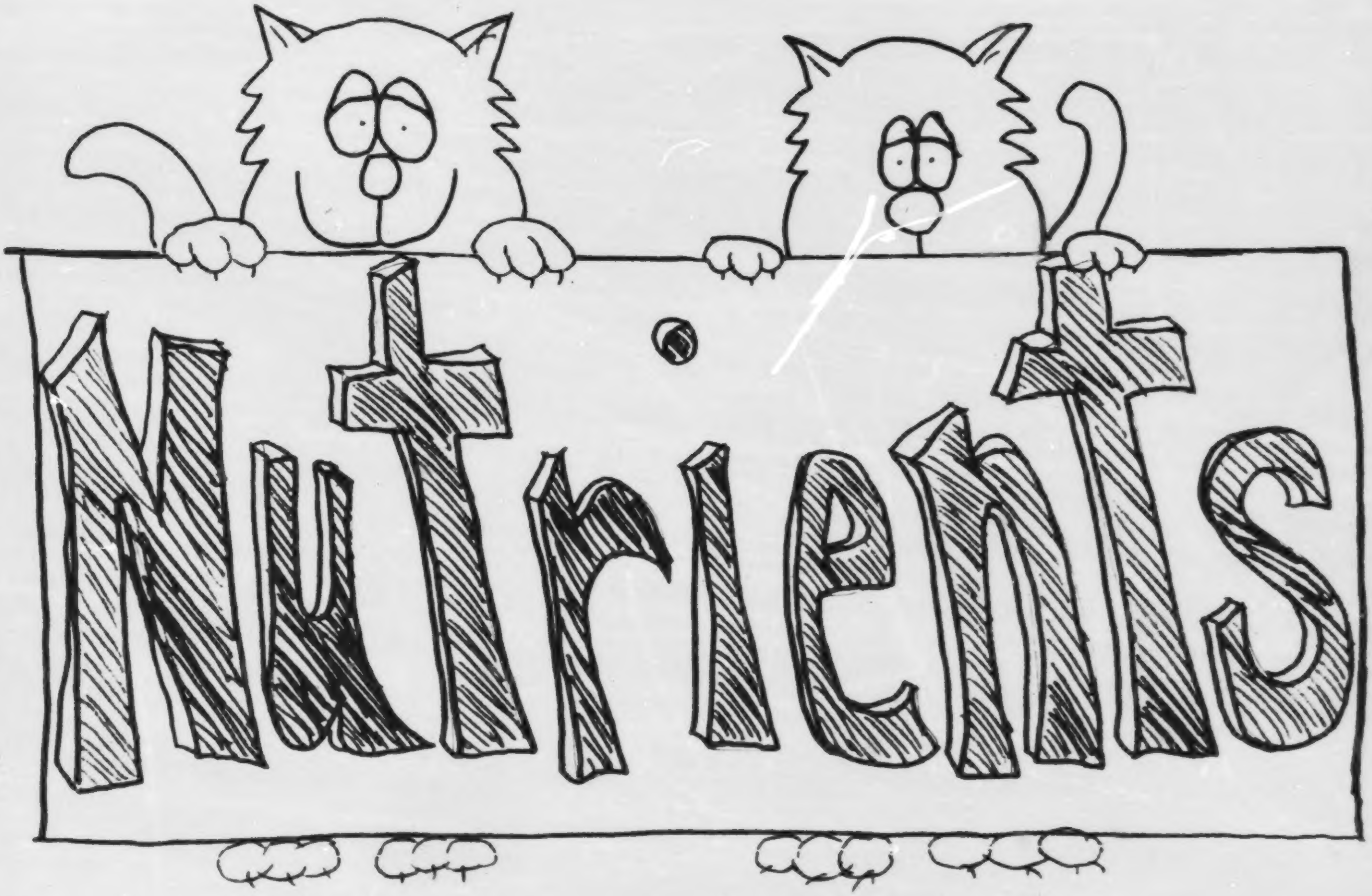
Why do school lunches follow the above guidelines? Discuss the difficulties in planning school lunches. Discuss lunches that are liked vs. those that are not. How can the lunches be improved?

*Prepare a written interview for the Cafeteria Manager. Invite the Cafeteria Manager to class and orally interview him/her. Use the answers as a language arts lesson for writing a newspaper article.

*From information from the Cafeteria Manager, have the class create a budget for feeding the whole school lunch.




MILK
MILK


Nutrients

What do our bodies really need from food? Nutrients are those substances that give us energy, keep us healthy, and help us grow. Students will perform experiments to identify what nutrients are provided by the different food groups, and to learn the functions these nutrients perform.

This unit also introduces the scientific method, and thus provides an opportunity to enhance students' critical thinking skills by teaching a framework of analysis to answer their questions.

"I like the nutrition lessons because I learn new things like testing starch. I never knew about starch until I did that test. Just because we can't see it, doesn't mean we can't find it...," said Tim DeSoto, Grade 4. The Nutrient unit has helped our fourth graders to develop their analytical skills and to look beyond the obvious.

Lesson Titles	Recommended Grade Levels
Fill It Up	4 - 6
Invisible Gold	4 - 6
Scientific Method	Teacher information
The Cat's In The Carbohydrates	4 - 6
The Sugar Is In The Cat Who Is In The Carbohydrates	4 - 6
Fat Cats	4 - 6
Burn Body Burn	4 - 6
Up To Here With Water	4 - 6
The Body's Helping Hands	4 - 6
Patient Proteins To Grow On	4 - 6
We Compliment Each Other	4 - 6
Nutrition Charades	4 - 6

Special Materials & Where To Find

Stethescopes - Our local hospital donated 'disposable' stethescopes that they use in their Intensive Care Unit. Try yours!

Tes-tape - Is available at all pharmacies. It is treated paper that is used by diabetics to test for sugar.

Sodium Hydroxide - Is an often used chemical. Try to borrow some from a junior high or high school science teacher.

Copper Sulfate - Is an often used chemical. Try to borrow some from a junior high or high school science teacher.

Food Cards - A set of laminated food pictures with nutritional information on reverse side (used for many lessons).

Order from - National Dairy Council, 6300 North River Road, Rosemont, IL 60018. #B012B Food Models - $6.00.

*The above materials are listed to assist you in locating them. All materials are listed with each lesson and most are readily available.

3!8

Fill It Up

purpose

To introduce the manner food is used in the body.

Materials: posters (p 273-275)

In this lesson students will learn why we eat. Food is the fuel that keeps our machine running. It provides growth, energy, and maintenance (Healthy bodies and repairs us when ill).

*Using the posters discuss the three functions of our bodies: growing, staying healthy, and having energy and why they are important to us.

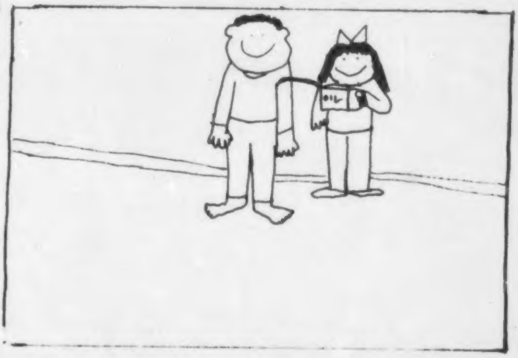
*Reinforce the meanings of energy, growth, and maintenance by having students act out roles that show an object other than a person performing activities that require energy, growth, or maintenance of health.

Examples:

Energy: A car driving around. (What does it use up as it moves? What do you do when it can't move?)

Growth: A seedling. What will the seedling need to grow into a plant? How does it get it?

Keeping Healthy: A machine that you use all the time. (What would you do to it to keep it running smoothly?)

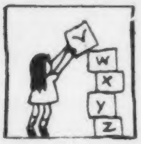


MORE

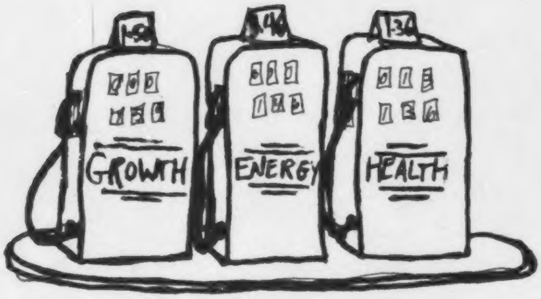
*In the same way, our bodies use nutrients from food we eat to help us grow, to keep us healthy, and to make us better when we are ill.

*Ask students if they can name one perfect food that can provide everything our body needs to grow, get energy, and maintain itself. There is no one food that is perfect. A variety of foods is necessary to provide all of the nutrients necessary to keep our bodies healthy. When our bodies do not have the necessary fuel going to all of its parts, then they are under stress.

How do our bodies use food? How can we be certain that we have energy? growing-power? healthy bodies?



Stethoscopes* can be used to demonstrate how our bodies use energy. Food is broken down into nutrients that travel through our blood. The heart is the pump that regulates how fast the blood flows. Show students how to use stethoscopes. Have them listen to their heart beat and count the beats per minute. Now have them run and count the beats per minute.



320

Invisible Gold

purpose

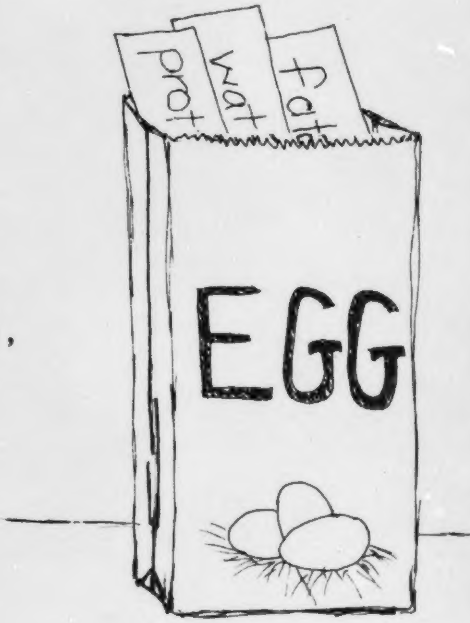
To introduce the concept of nutrients. Prior to this lesson students should be familiar with the purposes of food. (See 'Fill It Up!' page 319.)

Materials Small brown bags, pictures of food, nutrient labels to be placed in bags, nutrient chart (page 323).

Prepare for lesson by making food grab bags. On the outside of a bag attach a picture of a specific food. Inside the bag put individual labels of specific nutrients that are in that food.

Examples:

Meat Patty - protein, fat, vitamins (B_1, B_2, niacin), minerals (iron), water
Corn Tortilla - carbohydrates, vitamins (A), minerals (calcium), water
Swiss Cheese - fat, protein, vitamins (A), minerals (calcium), water
Watermelon - carbohydrates, vitamins (A,C), water, minerals (calcium)
Carrots - carbohydrates, vitamins (A), water
Spaghetti with meat balls - carbohydrates, protein, vitamins (A, C, niacin), minerals (iron), fats, water
Baked Beans - protein, carbohydrates, water minerals (iron)
Milk - fat, carbohydrates, water, minerals (calcium), protein, vitamins (B_2, D)
Egg - fat, protein, water
Peanut Butter - fats, protein, vitamins (niacin), water
Sugar - carbohydrates



ACTION The object of this lesson is to have students understand what nutrients are and to learn the six nutrient categories.

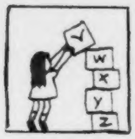
*Discuss nutrients. What we really want from foods are the nutrients - the chemical substances that (1) give us energy; (2) help us grow; (3) maintain our bodies and regulate body processes. There are about 40 or 50 nutrients found in food. These nutrients are grouped into six categories. Because each nutrient has a special job, we must take each into our bodies everyday. No food contains them all. We must eat a variety of foods to provide our bodies with all the nutrients we need.

MORE

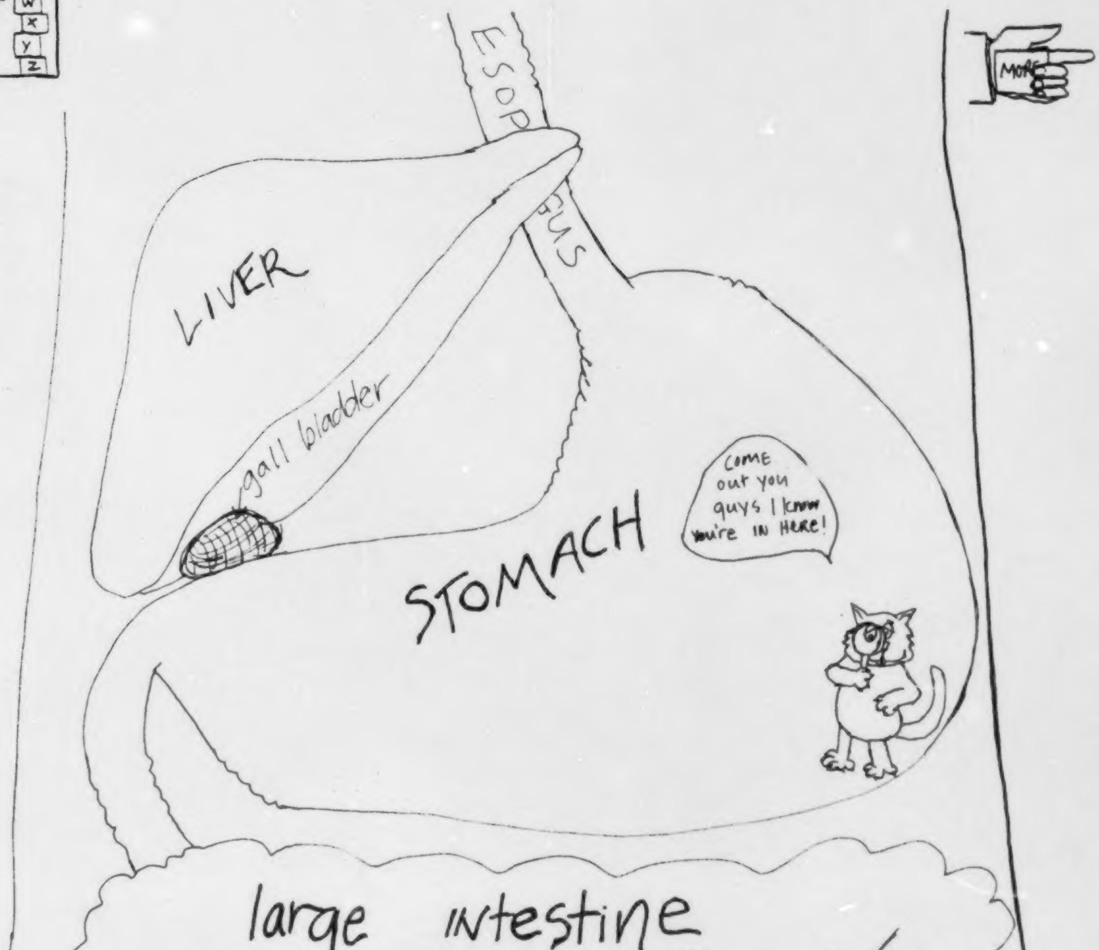
*Use the chart on the following page to teach the six nutrient categories. The sentence "Cats Wait For Mice Very Patiently" will help students remember the categories.

*Have students use the grab bags to reinforce the concepts: (1) that nutrients are an invisible part of food; (2) that a food may have more than one nutrient; (3) that different foods provide different nutrients and serve varied functions. Pass out the grab bags and start with a game of "If I looked inside an egg, what would I find?" Compare nutrients; are there some that all the foods have? Are there any that only one food has?

Where do you find nutrients? Why are nutrients important? What are the six categories of nutrients? Does all food contain the same nutrients?



Compare nutrients we get from food with nutrients plants get from soil. (See Soil Doctor page 133).

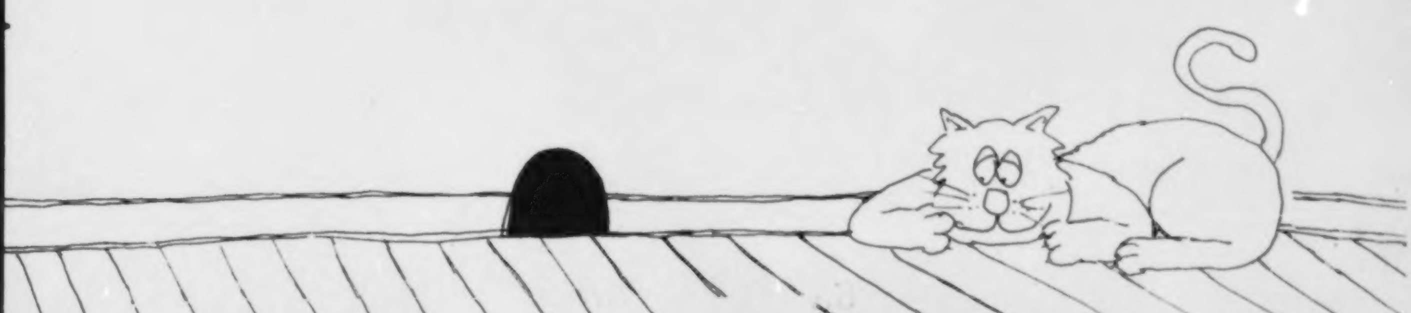

MORE
ESOPHAGUS
LIVER
gall bladder
STOMACH
COME out you guys I know you're IN HERE!
large intestine

Cats Wait Very Patiently

The Nutrient Chart

	NUTRIENT	FUNCTION	FOOD GROUP
Cats	carbohydrates	energy	grains fruits and vegetables
Wait	water	maintenance: carries nutrients in blood-maintains temperature	all
For	fats	energy/maintenance carries some vitamins	all
Mice	minerals	maintenance: regulate and maintain body functions	fruits and vegetables
Very	vitamins	maintenance: regulate and maintain body functions	fruits and vegetables
Patiently	protein	growth; tissue building and repair	proteins

Adapted from Peanut Butter and Pickles, Humboldt County Office of Education



Teacher Information:
The Scientific Method

In the following series of lessons students will be performing experiments to determine what foods contain which nutrients. However, the experience serves a purpose beyond a hands-on learning activity.

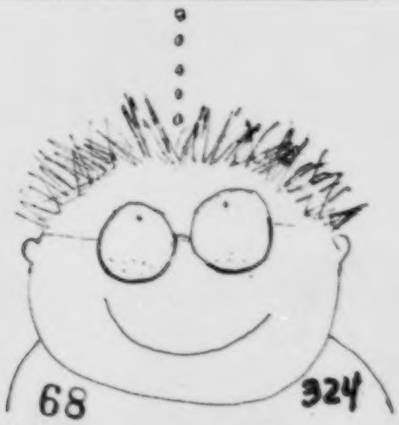
By using the scientific method, students will learn a system for analyzing information that isn't apparent to them. They will learn to create tests that will help develop information to answer their questions, and then to draw conclusions according to their data. If you continually use this process with all of the experiments, students will develop a logical system for observing and analyzing and thus thinking.

We suggest you use the following method when doing experiments:

INFORMATION: (1) Introduce the background data and the purpose of the experiment.
MATERIALS: (2) Give each student their materials.
HYPOTHESIS: (3) Have each student form their own hypothesis. (A statement that they will test in the experiment.) Or a student can form a question s/he will try to answer by the test and then make an educated guess as to what the results will be.
EXPERIMENT: (4) Have each student test his/her hypothesis.
RESULTS: (5) Have each student state his/her results.
CONCLUSION: (6) Have each student draw his/her own conclusion.

Example:

Information: Starch is a form of carbohydrate. Iodine turns black when starch is present.
Materials: Eyedroppers, bread, iodine.
Hypothesis: Bread contains carbohydrates.
or
Question: Does this bread contain carbohydrates?
Guess: Yes.
Experiment: Place drop of iodine on bread.
Results: The iodine turned black on the bread. Therefore, there is starch in the bread.
Conclusion: Therefore bread contains carbohydrates.



The Cat's In The Carbohydrates

purpose

To determine the types of food that contain complex carbohydrates (starch).

Materials: Two clear cups, one teaspoon cornstarch, water, five eyedroppers, iodine, food samples (bread, apple, potato, milk, tofu, etc.), nutrient chart (page 323).

ACTION

In this lesson students will review the use of carbohydrates in our bodies, and test for complex carbohydrates in foods. For this lesson, students should be aware of why we eat and what nutrients are.

*Discussion. Half the food we eat everyday gives us nutrients called carbohydrates. Carbohydrates are the main source of energy for our bodies. They are known as the "quick energy" because they are the first nutrients out of our stomach and on the way to providing energy for our bodies. There are three types of carbohydrates: complex, simple, and fiber. In this lesson we will test foods to see which ones have complex carbohydrates.

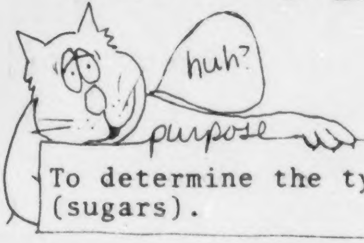
*Complex carbohydrates--are the starches and will provide our bodies with steady energy. Usually foods that have starches in them will also contain other nutrients.

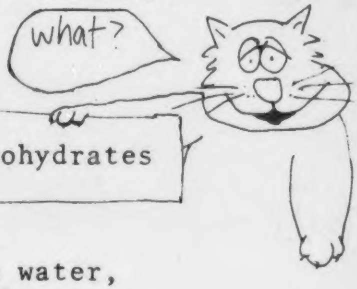
*Test for Complex Carbohydrates (please refer to the scientific method on page 324).
Purpose: To find out if specific foods have starch in them.
Background Data and Control: Fill two cups ¼ full with water. Stir ½ teaspoon of cornstarch into one cup. The other cup is the control. Add two drops of iodine to each cup. Have class observe what happens in each cup. (When iodine is added to starch it turns blue-black.)
Students' Hypotheses: Give each student a sample food to test. Have each state a specific hypothesis about their experiment. (Example: This bread has starch in it.)
The tests: Have each student put 2-3 drops of iodine directly onto their sample. The blacker the iodine turns, the more starch there is in the food.
Conclusions: Have each student state his/her result and draw a conclusion.

*Have students place the tested foods into the four basic food groups: protein, milk, grains, fruits/vegetables and the extra group. Ask them to draw conclusions as to which groups they think they would get lots of carbohydrates from.

What do carbohydrates provide for our bodies? What is starch? How can you tell if starch is present in food? Name three foods that will give you energy.

THE SUGAR IS IN THE CAT WHO IS IN THE CARBOHYDRATES





purpose

To determine the types of food that contain simple carbohydrates (sugars).

Materials: Small cups; tes-tape★; food samples (flour in water, orange, sugar in water, milk, zucchini, etc.); nutrient chart page 323.

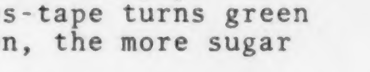
In this lesson students will test for simple carbohydrates and discuss the detriments of sugar for our bodies. Prior to this lesson students should have learned the way our bodies use food; what nutrients are; and have tested complex carbohydrates.

*Discussion: Carbohydrates are the nutrients that give us a steady source of energy. There are three kinds of carbohydrates: complex, simple, and fiber. In this lesson we will learn about simple carbohydrates.

*Simple carbohydrates - are the sugars that provide our bodies with energy rushes and the energy 'let downs'. Therefore simple carbohydrates are not as healthy for us as complex carbohydrates.

*Test for Simple Carbohydrates (please refer to the scientific method on page 324).
Purpose: To find out if specific foods have sugar in them.
Background data: Tes-tape is a chemically treated paper that diabetics use to test for sugar. If the tes-tape turns green then sugar is present. The darker the green, the more sugar there is.
Students Hypotheses: Give each student a sample food to test. Have each state a specific hypothesis about their experiment (Example: oranges contain sugar.)
Tests: Have each student dip a 1 inch piece of tes-tape in liquid of different foods.
Conclusion: Have each student state his/her results and draw a conclusion.

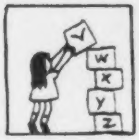
*Have students place the tested foods into the four basic food groups and the Extra Group. Ask them to draw conclusions as to which groups they think they would get many simple carbohydrates from. Sugar is usually found in foods within the Extra Food Group which includes white, brown, and raw sugar, honey, molasses, etc. Thus, simple carbohydrates are the sugary and less healthy form of carbohydrates. Note: Fruits contain complex and simple carbohydrates. However, fruits give us vitamins and minerals too, and extra food group foods don't.



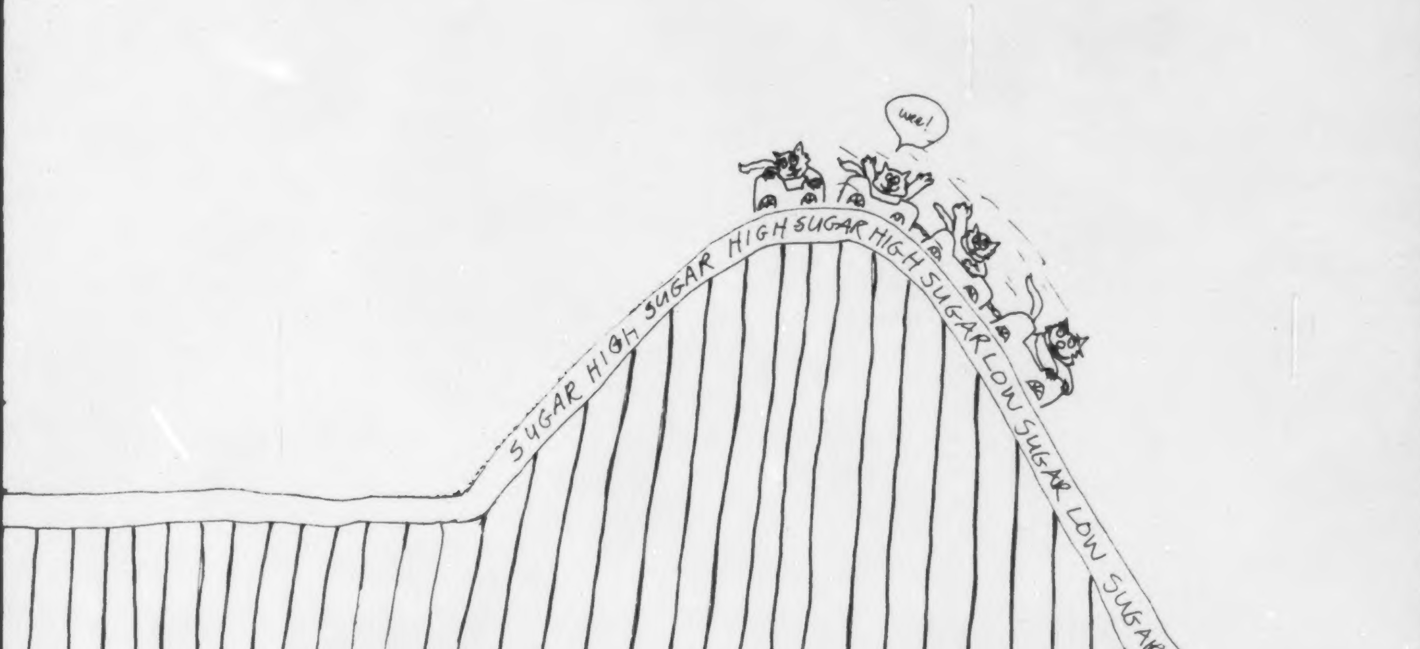
*How does our body react to sugar? Nutritionists have found that sugar: decays teeth; gives quick bursts of energy followed by low-energy let downs known as sugar crashes; gives our bodies lots of calories (about 24% of our diet) which turn to fat if we don't burn them up; gives our bodies NO other nutrients besides the quick energy.

We can tell when we are eating sugar by tasting sweetness; and/or by reading the labels on packages.

Why is sugar dangerous for our health? Name three foods that contain sugars? Why are fruits O.K. for us even though they have natural sugar in them? What are three foods that you like to eat that have sugar? What can you do to cut down the amount of sugar-food you eat?

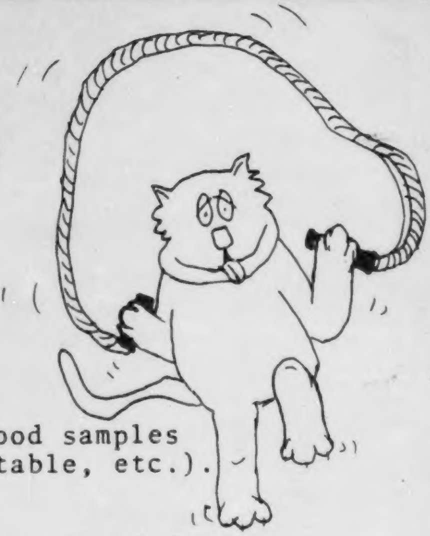


Make a healthy snack with the class that can take the place of often-eaten sugar snacks.


wee!
SUGAR HIGH SUGAR HIGH SUGAR HIGH SUGAR HIGH SUGAR LOW SUGAR LOW SUGAR LOW SUGAR LOW

327

FAT CATS



purpose

To introduce fat as a nutrient.

Materials: Three-inch squares of brown paper; food samples (oil, margarine, peanuts, milk, vegetable, etc.).

In this lesson students will learn the use of fat as a nutrient and test specific foods for fat content.

*Discuss fats with class. Fats are another source of energy for our bodies. However, we need very little to meet our needs. Fats give a steady, slow-burning fuel to our cells. (Carbohydrates, on the other hand, are quick burners and get used up more quickly.) We can store an unlimited amount of fat in our bodies. Where do we store fat? It's stored under every part of the skin, between muscles, around many of our organs, and even in the hollows of our bones. It's stored as an energy reserve of heat and fuel. When our bodies start to need more fuel than we're getting from the food we eat, it will convert the fat you've stored back into fuel for energy. If you're storing too much fat, how can you get rid of it? (Cut down on energy-providing foods so the stored fat can be used to provide your body's energy needs, and/or exercise so that your body needs more fuel to burn.)

Fat is found in food in two forms: visible and invisible. Visible fat can be seen with your eyes. Name some examples. (bacon, butter, margarine, fat on meats, etc.) Invisible fat cannot be seen. For example, some meats, poultry, eggs, whole milk, cheese, and desserts like cakes, ice cream, and chocolate contain invisible fats.

*Test food for fats:

(1) On a brown paper square rub a piece of food until it leaves a wet spot, or put a drop on the paper if it is liquid.
(2) Let the square dry.
(3) Hold the square up to light. If there is a greasy spot- if it looks translucent-the food contains fat.

(Note: Remember to have students use the scientific method by forming a hypothesis, testing it, and drawing a conclusion.)

How does your body use fats? What happens if you eat too many fatty foods? How can you get rid of excess fat? Name four foods that have fat in them.

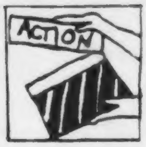
Burn Body Burn

LOOK MA! NO MATCHES!

purpose

To explore how our bodies produce energy.

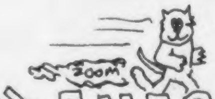
Materials: Metal pie plate, candle, jar, one walnut, one sugar cube, one iron tablet (crushed), one piece of aluminum foil (2" x 3"), matches, pencil with eraser, 1 straight pin, 1 teaspoon salt, 1 teaspoon oil, one cracker, one slice of bread, tongs.



In this lesson students will learn how our body produces energy from heat and experiment with foods to determine if they are energy providers. The corollary to this is discussing how we use that energy and the importance of a caloric-balanced diet.

*Demonstrate that heat is energy. Hang the foil from the top of a pencil eraser with a pin. Light a candle approximately four inches below the foil. The heat will rise, causing the aluminum to flutter.

Energy is produced in our bodies in a similar manner. Energy providing nutrients (carbohydrates, fats) help to heat up each of the cells in our body. This heat gives us energy to function. Thus if we eat foods that are high in carbohydrates and fats, we will have lots of energy to use. If this energy is not used up, it turns to fat on our bodies.



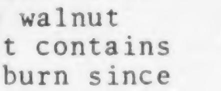
CARBOHYDRATES + FATS => ENERGY!

*Experiment to determine which foods give us energy. If a food will provide energy it will burn or melt.

(1) Have students form hypotheses as to whether each of the food samples will provide energy.

(2) Test the foods by placing each in the pie plate. Use a candle to ignite the foods. Some items will 'flame' more than others. The sugar will melt. The cracker and bread will burn since they contain carbohydrates. The walnut will burn for a particularly long time because it contains fat. The salt, water, and iron tablet will not burn since they are non-energy giving nutrients.

(3) Have students state their results and draw conclusions.



*Introduce Calories. Scientists measure the amount of heat food provides in calories. If a food has 100 calories, that means it will give us 100 calories of energy to burn up or 100 calories of fat to add to our bodies. Different types of food have different amounts of calories. On packaged foods, the calories will be written on the nutrition label.

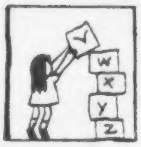
*Burning up calories. We need to eat enough calories to provide us with enough energy. A good diet would be: number of calories eaten = number of calories burned up in activities. Children aged 7-10 need about 2400 calories each day. The more active we are the more calories we burn. If you are running, the flames in your cells get bigger and bigger to give you more energy and you burn off more calories. Here's how we burn up calories:

QUIET THINGS:	READING, WATCHING T.V., EATING, SCHOOL WORK	·80-100 CALORIES PER HOUR
LIGHT ACTIVITIES:	WALKING SLOWLY, DOING DISHES	·110-160 CALORIES PER HOUR
MEDIUM THINGS:	WALKING FAST HOUSEHOLD CHORES	·170-240 CALORIES PER HOUR
ACTIVE THINGS:	BOWLING, RUNNING, BIKE RIDING	·250-350 CALORIES PER HOUR

*Getting Fat. If we don't burn up the calories we eat, we gain weight. A pound of body fat contains 3500 Calories. If you eat 3500 more calories of food than you burn up, then you store a pound of fat. 3500 calories is a lot of food. Usually we gain weight a little at a time.

A lot of people today are overweight. This is dangerous for our health. There are two ways to lose extra weight. One is to not eat as many calories in a day. (If you cut out 500 calories each day, at the end of the week you would lose one pound.) The other way would be to burn up more calories by exercising more.

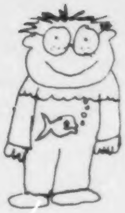
How do our bodies use heat? Define calorie. Which nutrients give us calories? Why is it important to watch how many calories we eat? Name three ways you like to burn up your calories. How did our great-grandparents burn up more calories than we do?



Have students keep a diary of what they eat and their activities for one day. Use a calorie book to determine the approximate number of calories eaten. Compare this with the number of calories burned up. Is it a balanced equation?

Adapted from San Jose Nutrition Education Project, San Jose Unified School District

Up To Here With Water



purpose

To introduce water as a nutrient.

Materials: Fresh celery stalk with leaves; 2 glasses of water; food coloring; salt (1 tsp.); cotton; rubbing alcohol.

ACTION

In this lesson students will use experiments to demonstrate the significance of water in maintaining our bodies.

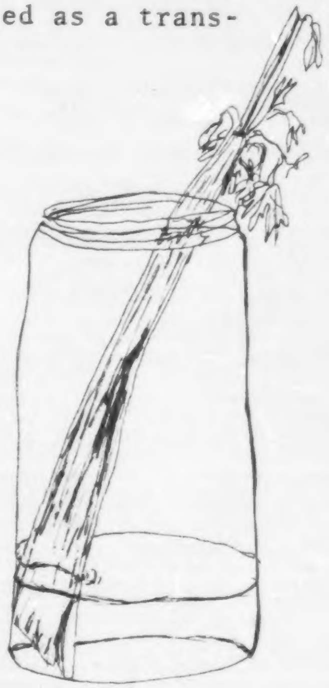
Water is the basic ingredient of our transportation system--the bloodstream. It carries nutrients to our cells and carries wastes from the cells. Water also helps to regulate body temperature. When we exercise a lot, or it's hot outside, our body temperature increases. To prevent us from burning up, we sweat and the evaporating water cools our bodies.

Two-thirds of our body weight is water. If you weigh 90 pounds, 60 pounds is water. Water is in our cells, in our blood, and around our cells. Thus it is important for us to eat and drink foods that contain water.

Water is found in all of the food we eat. Good sources of water are fruits and vegetables, juices, milk, and -of course- water.

*Do this experiment to demonstrate how water is used as a transportation system in our bodies:

(1) Put a stalk of celery with the bottom cut off in a container of water to which you have added food coloring.
(2) Ask students what will happen.
(3) Demonstrate what happens with earlier sample. (Or set the fresh celery experiment aside in a visible place and return to it in 2-3 days.) The food coloring reached the leaves because the water moved through the plant carrying nutrients throughout the plant. Our bloodstream works in the same manner.
(4) Cut open the earlier sample. How does the water travel through the stem? Can this relate to our veins and arteries?



MORE

*Do this experiment to demonstrate how nutrients are absorbed in water.

(1) Put a teaspoon of salt in the bottom of a glass.
(2) What happens to the salt? (It stays on the bottom.)
(3) Add water to the salt and stir.
(4) What happens to the salt? It dissolves in the water. In the same manner, nutrients dissolve in our blood and are carried throughout our bodies.

*Do this experiment to demonstrate the cooling effect of water evaporating from our bodies.

(1) Rub a little alcohol on your arm with a piece of cotton.
(2) How does it feel? (Cooler than the rest of your arm because alcohol evaporates more rapidly than perspiration, but it has the same effect.)

—FINISH—
.100
SH

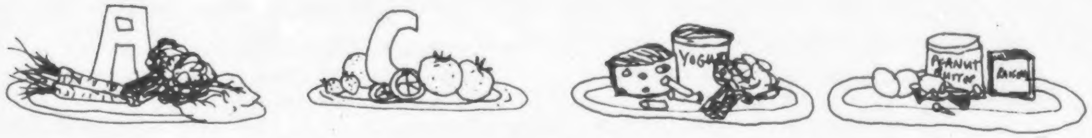
Why is water so important to your body? What would happen if you did not sweat? Describe your bloodstream as if it were a river system: what does it transport? how does it get replenished? how does it cleanse itself (eliminate wastes)?

The Body's Helping Hands

purpose

To introduce the body's need for vitamins and minerals.

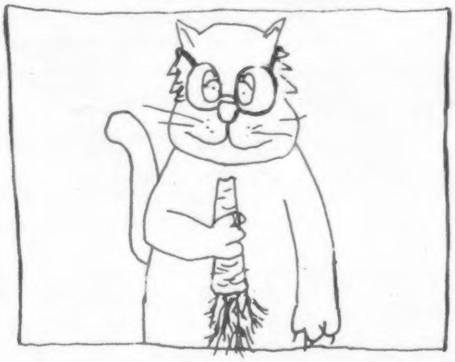
Materials: Nutrient chart and prepare:
(1) A plate with the letter A in the center and food samples of: carrot sticks; broccoli; yellow squash; swiss chard or spinach.
(2) A plate with the letter C in the center and food samples of: orange slices; grapefruit slices; (can also add strawberries, tomatoes, green peppers).
(3) A plate with a piece of white chalk in the center and food samples of: cheese; yogurt; broccoli.
(4) A plate with rusty nails in the center and food samples of: hard boiled eggs; raisins; nuts.



*Discuss vitamins. Vitamins work in our bodies to keep us healthy. They are a 'helping hand' with food digestion, wound healing, blood clotting, good eyesight, and much more. There are 14 vitamins that are essential for us to eat for good health. We can get them all by eating a variety of food. (Plants can make their own vitamins, while animals must get their vitamins from their diet.) Vitamins do not give us energy. They help our bodies function properly.

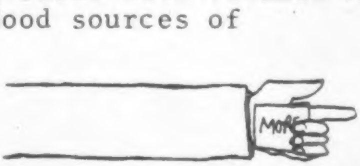
Vitamin Examples

Vitamin A - (use plate 1)



Each vitamin has different functions. Vitamin A helps keep skin healthy; keeps eyesight good; helps us grow properly; and buildsresistance to infection.

Vitamin A is an example of a fat-soluable vitamin. Vitamins A, D, E, and K are all fat-soluable which means they are stored by the body and used when needed. Thus we can get enough Vitamin A by eating foods with Vitamin A every other day. Good sources of



Vitamin A are: dark green and yellow/orange fruits and vegetables; beef liver; cheese and milk.

Sample the foods on the Vitamin A plate.

Vitamin C (use plate 2)

Vitamin C helps strengthen walls of blood vessels.
Vitamin C keeps gums healthy.
Vitamin C helps the body resist infection (prevent colds, etc.)
Vitamin C helps wounds and cuts heal.
Vitamin C is an example of a water-soluable vitamin.

The body does not store water-soluable vitamins and we must eat food rich with them everyday.

Citrus fruits are good sources of Vitamin C. Cantelope, broccoli, strawberries, tomato, cabbage, green peppers and potatoes also give us Vitamin C.

Sample foods on Vitamin C plate.

*Discuss minerals. Although there are minerals all around us, there are only 17 that our bodies need and we get them from the food we eat. Minerals, like vitamins, keep us healthy and our body functioning properly.

Mineral Examples

Calcium - (use plate 3)

Calcium is a very important mineral for us. It helps to build strong bones and teeth. A good source of calcium is milk and milk products. Broccoli is also calcium-rich.

You can see what calcium looks like by examining the piece of chalk. Chalk is made from calcium.

Sample the foods on the calcium plate.

Iron (see plate 4)

*Have the class examine the rusty nails and discuss why they are red. (When iron comes in contact with oxygen a chemical reaction takes place turning the iron red.)

Iron is in our blood and helps to carry the oxygen from our lungs to all of the cells. That is why the blood that is carrying the

oxygen looks red. The blood in our veins looks blue (look at your wrists) because this blood is returning to the heart and has no oxygen in it.

"*Iron*-poor *blood" can make you feel* tired because the blood will not be able to pick up oxygen as well as needed. The oxygen is needed to help burn food in the cells which gives us energy. Thus if the cells do not get enough oxygen, we don't have enough energy.

Sample the iron-rich foods.

*Summary. Vitamins and minerals keep us healthy by helping our bodies function properly. You can get all the vitamins and minerals you need by eating a variety of foods. (The fresher the better!) Sometimes people supplement their food with vitamin and mineral pills.

Why are vitamins and minerals necessary for us? Name a food you like that gives you more than one vitamin. Trace a mineral back to its source. Trace a vitamin back to its source. Name a good source of Vitamin A; Vitamin C; calcium; iron.

I CAN GET ALL THE VITAMINS AND MINERALS I NEED RIGHT HERE!
VINO

Patient Proteins to Grow On

purpose

To introduce the use of proteins in the body.

Materials: Nutrient poster p. 323, sodium hydroxide solution★, copper sulfate solution★, eyedroppers; 5 small jars, food samples: (milk; egg; zucchini; tunafish; tofu; cookies; juice, etc.)

ACTION

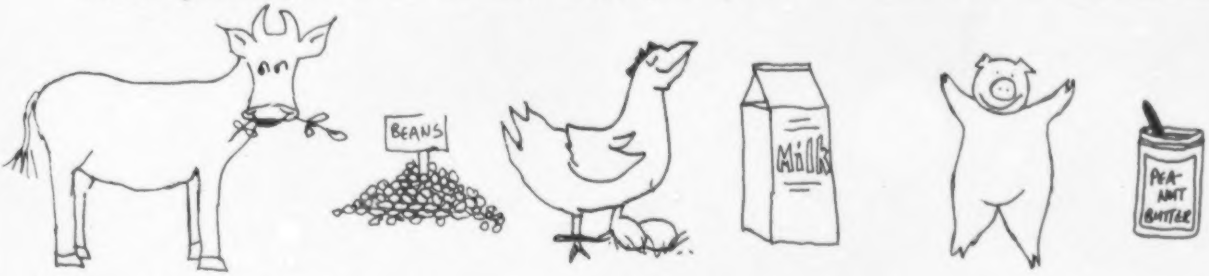
In this lesson students will use the scientific method to test foods for the presence of protein.

Proteins are absolutely necessary to our bodies. They are essential for proper growth. They help to form our muscles, hair, bones, fingernails, brain, glands, teeth, and other solid matter in our bodies. Proteins also repair tissues.

PROTEIN PAL

Adults eat about 1,000 pounds of food in a year. Only about 100 pounds of that food is protein. How much protein we need depends upon our weight. If you're between 11 and 14 you need about 44 grams of protein each day. Why not look at the nutrition labels on the foods you eat to see how much protein you get?

Good sources of protein are: eggs, meat, fish, poultry, nuts, beans, milk products.



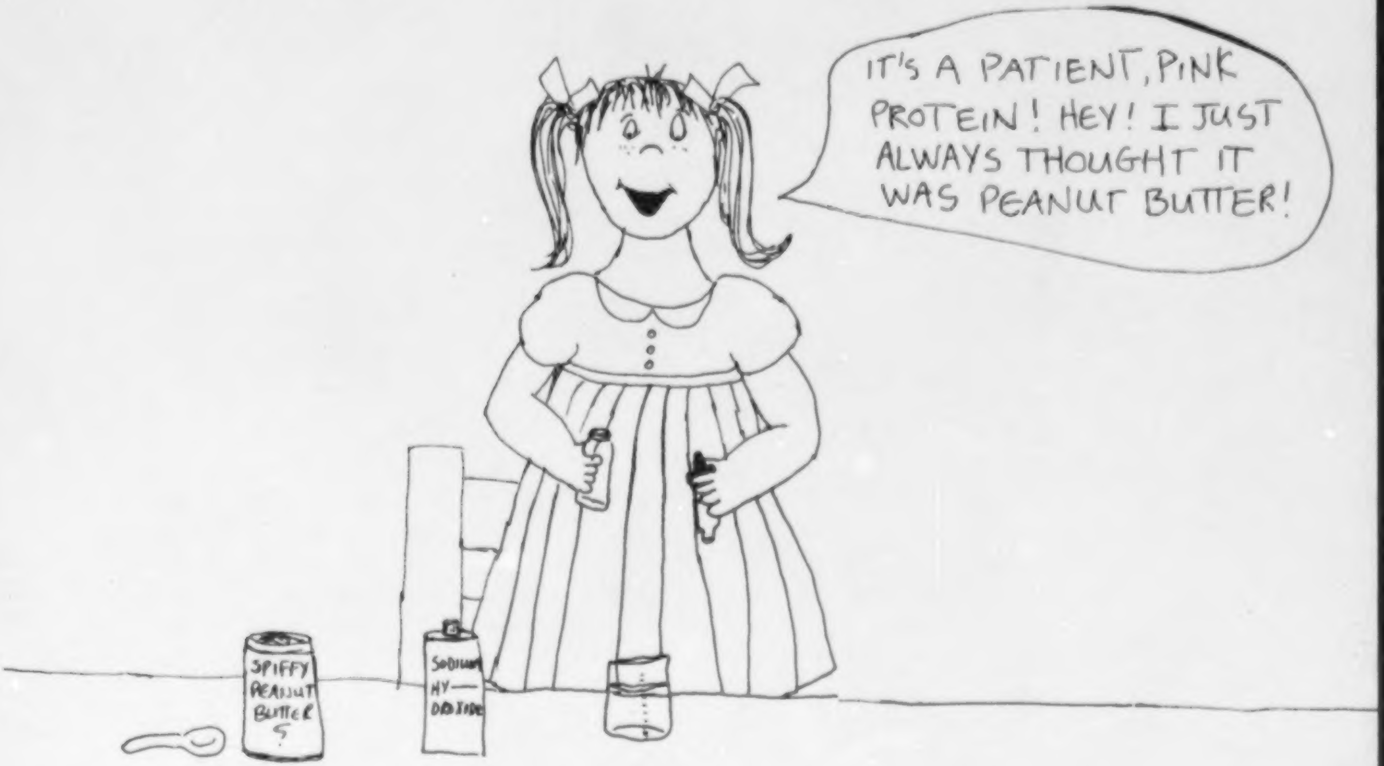
[1] Be Careful! Sodium Hydroxide (lye) is poisonous and can burn! Put one layer of pellets on the bottom of a 1 quart jar. Add 1 pint of water. Stir until all pellets are dissolved.

[2] Copper Sulfate is poisonous. Dilute 20 grams in 62 mililiters (¼ cup) of water. (You should be able to borrow these chemicals from a junior high or high school science laboratory.)

MORE

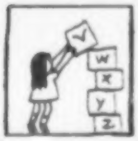
*Use the scientific method (p.324) to test sample foods for protein:

1) Pour a little sodium hydroxide solution into a jar. (so that it fills the jar about 3/4")
2) Add food to the jar. (solid food should be crumbled)
3) Add a few drops of copper sulfate solution.
4) Stir.
5) If protein is present, you will see a pink-bluish color.


IT'S A PATIENT, PINK PROTEIN! HEY! I JUST ALWAYS THOUGHT IT WAS PEANUT BUTTER!
SPIFFY PEANUT BUTTER
SODIUM HY-DROXIDE

*List the foods you found proteins in. We find proteins in the milk group and protein group. To get enough protein you should eat two servings a day from the protein group.

Why do we need proteins? Name four foods you eat that are good protein sources. What food groups contain proteins? Do you think all living things need proteins? Why or why not?



Make a high protein snack such as peanut butter (See recipe page 417).

We Compliment Each Other

purpose

To discuss vegetarianism and the building blocks of proteins-amino acids.

Materials: Pencil and journal; recipe ingredients and cooking materials.

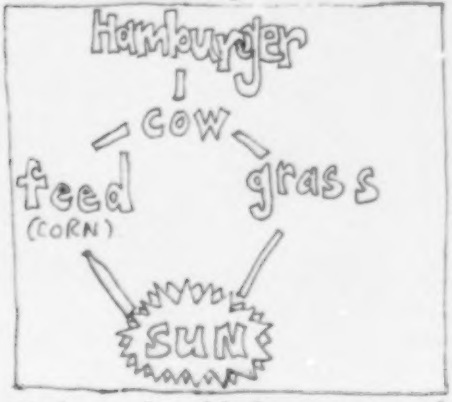
In this lesson students will explore the reasons people are vegetarians. After learning about complimentary proteins, they will prepare a vegetarian meal that provides all the necessary amino acids for a complete protein.

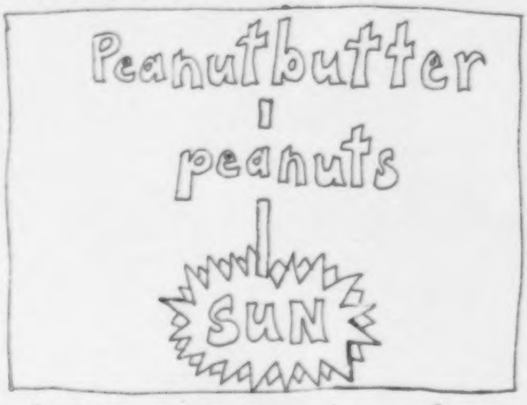
*A vegetarian is an individual who does not eat meat. Discuss why a person may be a vegetarian. Some reasons:

HEY! THIS SAVES A WHOLE STEP!

(1) It is less expensive than eating a meat-diet
(2) To avoid killing animals
(3) Cultural reasons
(4) Religious reasons
(5) Health reasons
(6) It uses up less energy and provides food for more people

*Have students give an example of a vegetarian food and a meat food. Write each example on the blackboard. Make a food chain for each example tracing it back to its source.





With each added step on the food chain more energy is used up and the product becomes more expensive. When a farmer grows feed corn for cows, he stops growing more food directly for people. Would it be easier to grow peanuts for lots of peanut butter or cows for lots of hamburgers?

MORE

*Vegetarians can get plenty of carbohydrates, vitamins, and minerals, and enough fat from fruits, vegetables, and grains, but they must carefully plan their proteins. Proteins are made up of building blocks called amino acids. There are a total of 22 amino acids. Our bodies can manufacture 14 of them. The other 8 are called essential amino acids and we must eat these 8 at the same time in order for our bodies to be able to use the protein. Animal proteins (meat, fish, poultry, eggs) have all 8 essential amino acids. Plant foods have some of the amino acids, but usually not all 8 can be found in one plant food. However, by combining certain foods, we can get all the protein we need.

BY COMBINING:

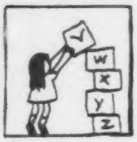
WHOLE GRAINS AND LEGUMES = COMPLETE PROTEIN
MILK PRODUCTS AND WHOLE GRAINS = COMPLETE PROTEIN
SEEDS AND LEGUMES = COMPLETE PROTEIN

*Have students give examples of the above combinations.

IF I BECOME A VEGETARIAN, I'LL HAVE TO GIVE UP MICE...

*Prepare a vegetarian meal that provides a complete protein. See recipe for lentil soup p. 416 and whole wheat bread p. 408.

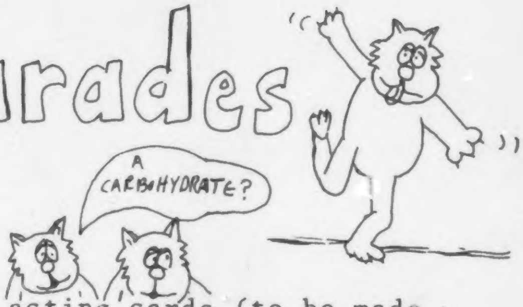
What is the most difficult nutrient for a vegetarian to get? What are the building blocks of proteins? Name a plant food combination complete protein that you like to eat. What changes would take place if your whole class was vegetarian? If your whole city was vegetarian? The whole world?



*Have students research diets of different cultures and explore why some are vegetarian-based.

*Play the Forty for Fortitude Game p. 300 with students getting extra points for combining complete proteins.

Nutrition Charades


A CARBOHYDRATE?

purpose

To complete the study of nutrients.

Materials: Nutrient chart, game cards: acting cards (to be made from the list on p.341); answer cards (see p. 341)

In this lesson students will use their knowledge of the purpose of nutrients and sources of specific nutrients to play a game of nutrition charades.

*Review the nutrient chart emphasizing the functions of specific nutrients and the food groups where they can be found. Let students refer to the chart during the game.

*Object of game: Team members will guess what role the actor is playing and then hold up appropriate food card that the actor should eat in his/her situation.

*Participants: Director - Teacher.
Actor - Student who silently acts out situation on acting card.
Team - Remaining students who guess what actor is acting and then hold up proper food card.

*Procedure:
(1) Director reviews basic charade rules: the actor cannot speak while the team tries to guess what s/he is acting.
(2) The team will respond with three answers: the team will guess what role the actor is playing; name what nutrient would be most helpful in that situation; hold up food cards that contain a high amount of that nutrient.
(3) Director places set of answer cards in center of team.
(4) Director chooses first actor and helps them select an act from acting cards.
(5) While actor prepares charade, team should look at answer cards.
(6) Actor silently acts out charade; team answers according to Step 2.
(7) The first team member to hold up a correct answer card is the next actor.

Which nutrients are good energy sources? Which nutrients help us grow? Which nutrients help maintain our health? Name the major nutrients you can find in each food group. What is the best way to make sure you get all of the nutrients you need?

MORE

ANSWER SHEET
FOR
NUTRITION CHARADES

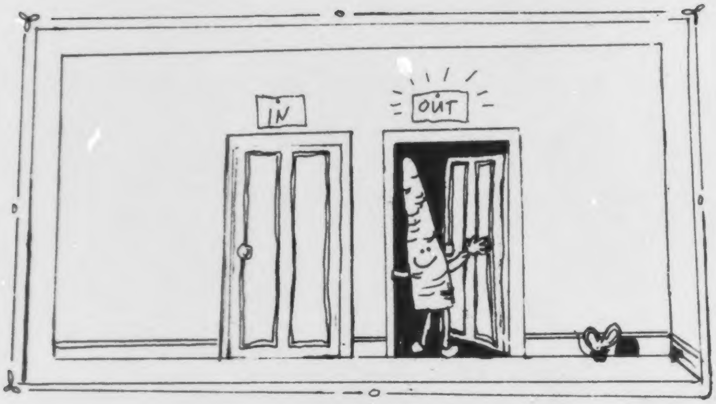
Acting Cards[1]	Major Nutrient Needed[2]	Appropriate Answer Cards[3]
Runner in a race; sweating	Carbohydrates	All fruits and vegetables, grains
Tired person	Carbohydrates, minerals	All fruits and vegetables, grains, meats
Bicycle rider	Carbohydrates	All fruits and vegetables, grains
Person loading large crates into truck	Carbohydrates	All fruits and vegetables, grains
Weight lifter	Protein	Protein group - meats, fish, poultry, legumes
Person with a cold	Vitamins, minerals	Fruits & vegetables
Pre-season football player	Protein	Protein group
Truck driver	Food without carb/fat	Vegetables & fruits, skim milk products, fish, chicken
Person reading	Food without carb/fat	Vegetables & fruits, skim milk products, fish, chicken
Person watching TV	Food without carb/fat	Vegetables & fruits, skim milk products, fish, chicken
Eskimo	Fats	Milk products, meats

[1] Make up acting cards by putting each action on an individual card. Add some of your own!

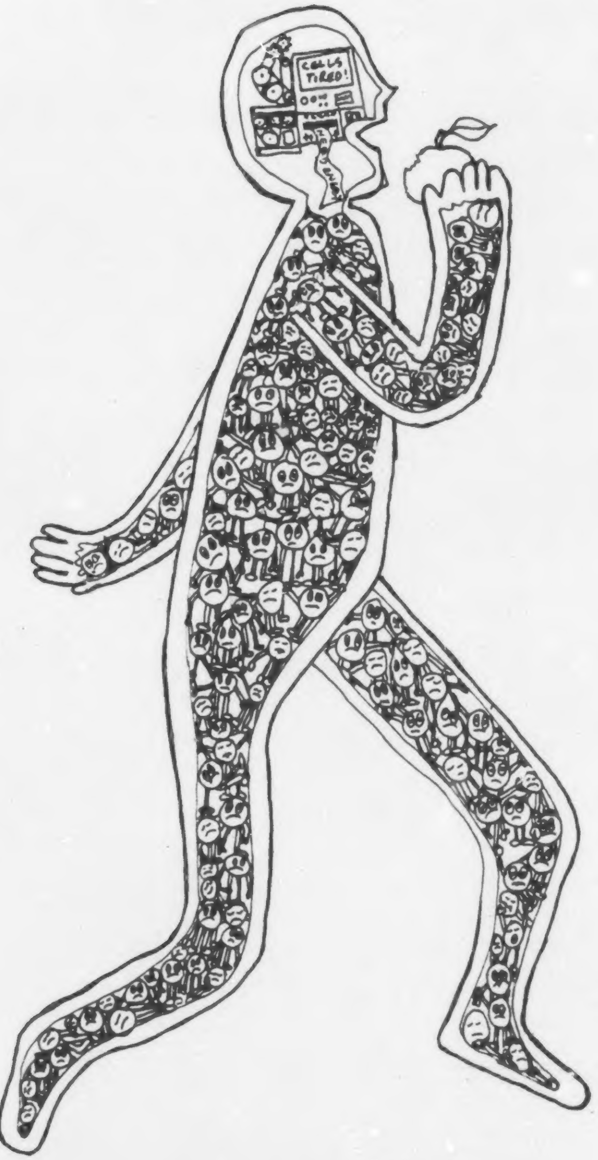
[2] All of these people want a balanced diet (all of the nutrients that are needed for them to function); however some will want more or less of a specific nutrient because of their activity.

[3] Answer cards should be individual foods within the listed groups. The Dairy Council Food cards★are good to use because they provide pictures and specific nutrition content. However, you can just write names of food on cards.

341


IN
OUT

DIGESTION


CELLS TIRED!

The path of food through our bodies is one of chemical reactions and absorption as food is broken down into simple substances to feed our cells. This unit begins with exploring our taste buds and ends with examining our cells. In between are chemistry experiments that replicate the digestive process, and an introduction to the circulatory system.

The miracle of our 'portable chemistry labs' has been explored by Life Lab fifth graders to help them understand the workings of their bodies.

Lesson Titles	Recommended Grade Levels
Pleasure Points	5 - 6
Small Is Invisible	5 - 6
I Ate The Whole Thing	5 - 6
The Portable Chemistry Lab	5 - 6
Introduction	Teacher information
Part I	5 - 6
Part II	5 - 6
Part III	5 - 6
Part IV	5 - 6
The One Way Road	5 - 6
The Stoplight	5 - 6
My Basic Ingredient	5 - 6
It's All Mish Mash To Me	5 - 6

Special Materials & Where To Find

Stethescopes - Our local hospital donated 'disposable' stethescopes that they use in their Intensive Care Unit. Try yours!

Tes-tape - Is available at all pharmacies. It is treated paper that is used by diabetics to test for sugar.

Microscopes - Can usually be borrowed from a junior high or high school science teacher.

Sodium Hydroxide (lye) - Is a common chemical. Try to borrow pellets from a junior high or high school teacher. Dilute according to directions in lesson.

Copper Sulfate - Is a common lab chemical. Try to borrow from a junior high or high school teacher.

Hydrochloric Acid - Can be purchased as muriatic acid.

Pepsin - Can be ordered through - Carolina Biological Supply, Burlington, NC 27215. (800) 334-5551. 4oz. - $10.00.

*The above materials are listed to assist you in locating them. All materials are listed with each lesson, and most are readily available.

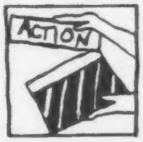
Pleasure Points

purpose

To discover how taste, smell, and sight interact for our sense of taste.

Materials: Mirror, 4 tongue depressors, magnifying glasses, grapefruit juice, red food coloring, tongue model, four glasses, 2 clear glasses, 1 peppermint candy, 1 blindfold, 1 teaspoon salt, 1 teaspoon honey, 1 teaspoon lemon juice, 1 teaspoon cocoa(unsweetened), spoon, shoebox.

*Preparation:
(1) Make large tongue model out of material. (Ours is 1 foot by 3 feet!) Mark the 5 zones on it.
(2) Mix in the 4 glasses one of each of the following: salt and water; honey and water; cocoa and water; lemon and water. Place mixtures with peppermint candy in shoebox so students can't view these materials.
(3) Mix a little red food coloring in half of the grapefruit juice.



In this lesson students will learn how we taste food and the function of our taste buds. Through experimentation they will examine how sight and smell affect our perception of taste.

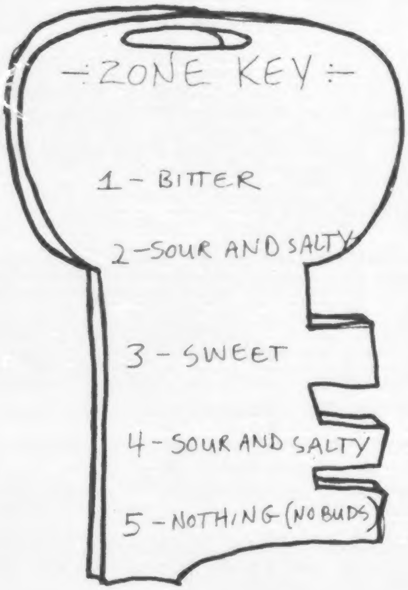
*Discuss how we taste our food. There are tiny wart-like bumps that cover the tongue that are called papillae. The taste buds are in the walls of these papillae. The tastes of the human tongue are distributed on different zones. Each zone has a different taste. Use the mirror and magnifying glass to look at your tongue.

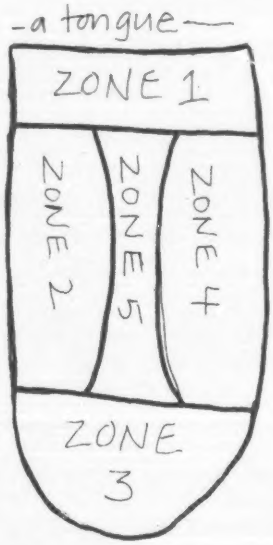
(Not all animals use their tongues for tasting. Fish can taste with their tail fins. While humans have 3,000 taste buds, cows have 35,000 taste buds, whales have few or no taste buds, and a pig has 55,000 taste buds!)

*Use the tongue model and the 'Shoebox Ingredients' to identify taste bud zones.

MORE

Blindfold one student. Tell the student you will put a liquid on her/his tongue and you would like her/him to (1) identify the taste: bitter, sweet, sour, salty; and (2) using the tongue model point out which zone it was tasted in. Now stir up the lemon juice mixture and apply it to all areas of the tongue with the depressor. Have the student answer the two questions. Then repeat this procedure with the honey, salt, and cocoa mixtures.


ZONE KEY
1 - BITTER
2 - SOUR AND SALTY
3 - SWEET
4 - SOUR AND SALTY
5 - NOTHING (NO BUDS)


a tongue
ZONE 1
ZONE 2
ZONE 5
ZONE 4
ZONE 3

Our sense of taste is translated to the brain once our taste receptor nerves send their messages to the brain.

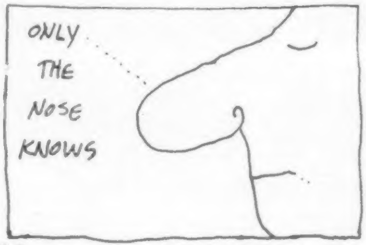
oooh.... It's gross!

*This experiment demonstrates how sight affects taste.

Put yellow grapefruit juice in one glass and pink grapefruit juice in another. Have a student taste the juices and decide which one is sweeter. Then repeat this procedure with another student who is blindfolded.

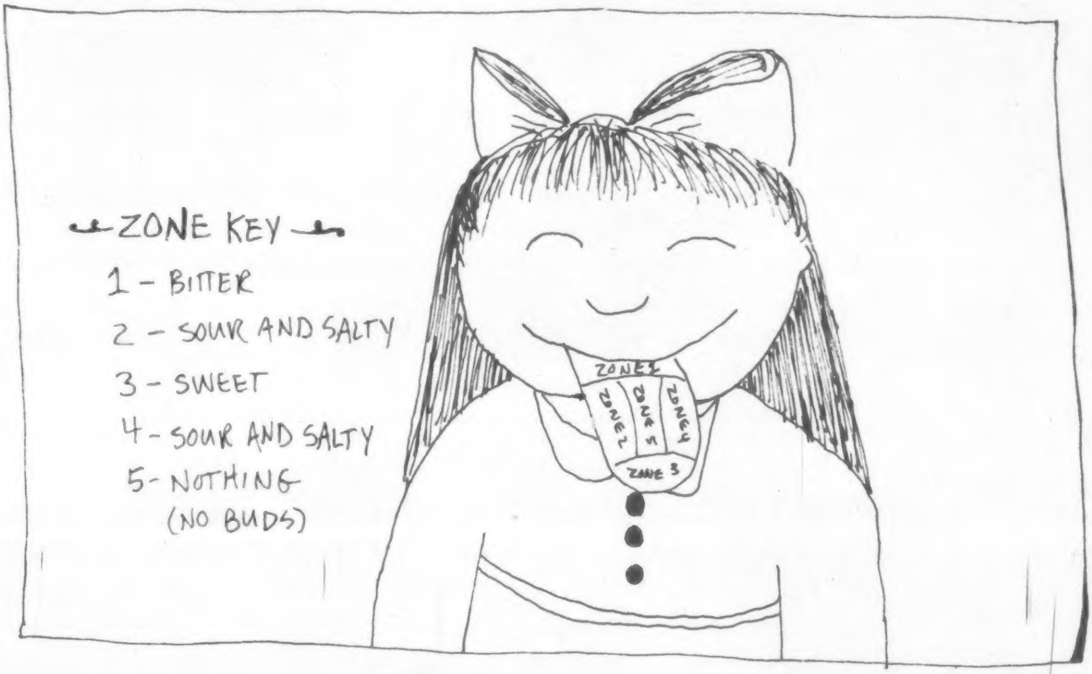
Surveys have shown that students will think the pink one is sweeter due to the warm color. Discuss the role our sense of sight plays on our taste buds. We are not dependent on our sight for taste but we are greatly influenced by how food appears to us.

*This experiment demonstrates how smell affects taste.


ONLY
THE
NOSE
KNOWS

Blindfold a student and have him/her hold his/her nose tightly closed. Then place a peppermint candy in the subject's mouth. Have the student try to identify the taste without letting go of his/her nose. The student should not be able to identify the peppermint taste.

Discuss the role of smell in tasting. Smells can stimulate our hunger centers. We start to form a natural fluid produced by the salivary glands called saliva. Aroma causes a message to be sent to our brain which triggers our stomach to rumble indicating the body's desire for nutrients.


ZONE KEY
1 - BITTER
2 - SOUR AND SALTY
3 - SWEET
4 - SOUR AND SALTY
5 - NOTHING
(NO BUDS)
ZONE 1
ZONE 2
ZONE 5
ZONE 4
ZONE 3

What three senses interact to determine our taste? What four tastes do our taste buds register? Do you think blind people taste their food differently? Give an example of when you haven't eaten something because of its appearance. Give an example of when the aroma of food has influenced your eating. Why do you think we have a sense of taste? What are your taste preferences?

small is . . . invisible!

purpose

To introduce the digestive system.

Materials: Two clear cups; 1 tsp. cornstarch; 1 tsp. sugar; 1 body outline; water; spoon; 1 set of digestive system parts and labels.

*Preparation--body outline: on large poster board draw an outline of a body with the head in profile position. Digestive system parts and labels: on separate poster board cut out outlines of the five digestive organs on p. 350-352 . These should fit into the body outline. Also cut out the function descriptions. It helps to use velcro on the body outline and the organs and functions so they will stay in place.

ACTION

In this lesson students will be introduced to the digestive system and learn how food must be broken down to small particles in order to be used by our bodies.

*Define digestion. Most foods that we eat cannot be used by our bodies in the form that we eat them. They must be broken down in to smaller particles so they can be absorbed by our blood stream and carried around our bodies. The process of breaking foods down so that our bodies can use them is called digestion.

Examples of absorption:

(1) Place 1 teaspoon of cornstarch in 1 glass of water and 1 teaspoon of sugar in another.

(2) Stir the contents of each glass with a spoon. Have students observe the solutions and describe what they see after stirring.

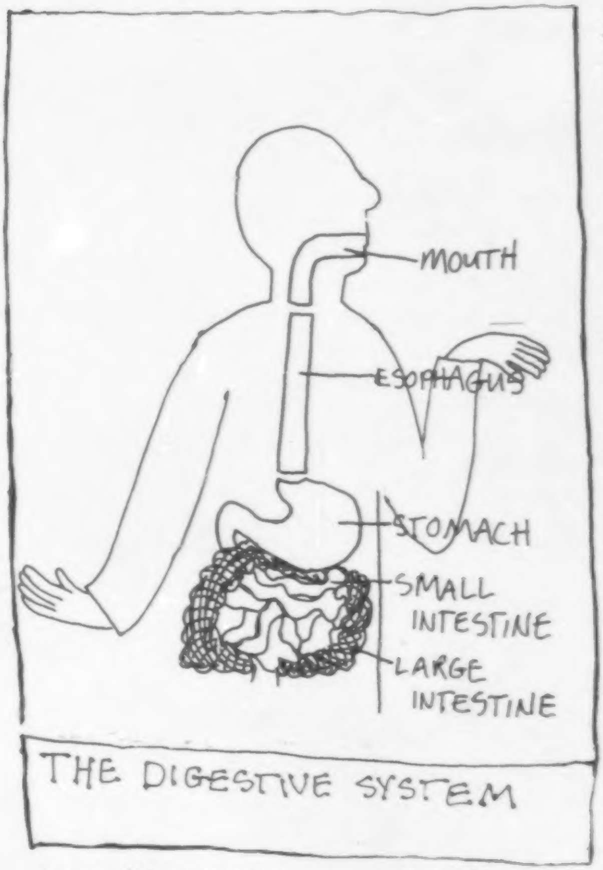
(3) Has the starch dissolved? (No. Starch is a complex carbohydrate made up of many units. In order to be absorbed by our blood stream it must be broken down into smaller units.)

(4) Has the sugar dissolved? (Yes. Sugar is a simple carbohydrate made up of fewer units. It can be absorbed directly by our blood stream.)

*Our Digestive System. Food must be broken down into smaller parts that the body can use for energy, growth, maintenance of health. Our bodies have five parts (organs) which automatically do this for us. These five organs make up the digestive system.

MORE

(1) As you talk about each organ, place the organ in its proper place on the body outline with its function label next to it.



Mouth - chews food into smaller particles that the body can use.

Esophagus - pushes the chewed food down to the stomach. It takes about 1 second for liquids to travel down the esophagus and 6 to 7 seconds for solid food.

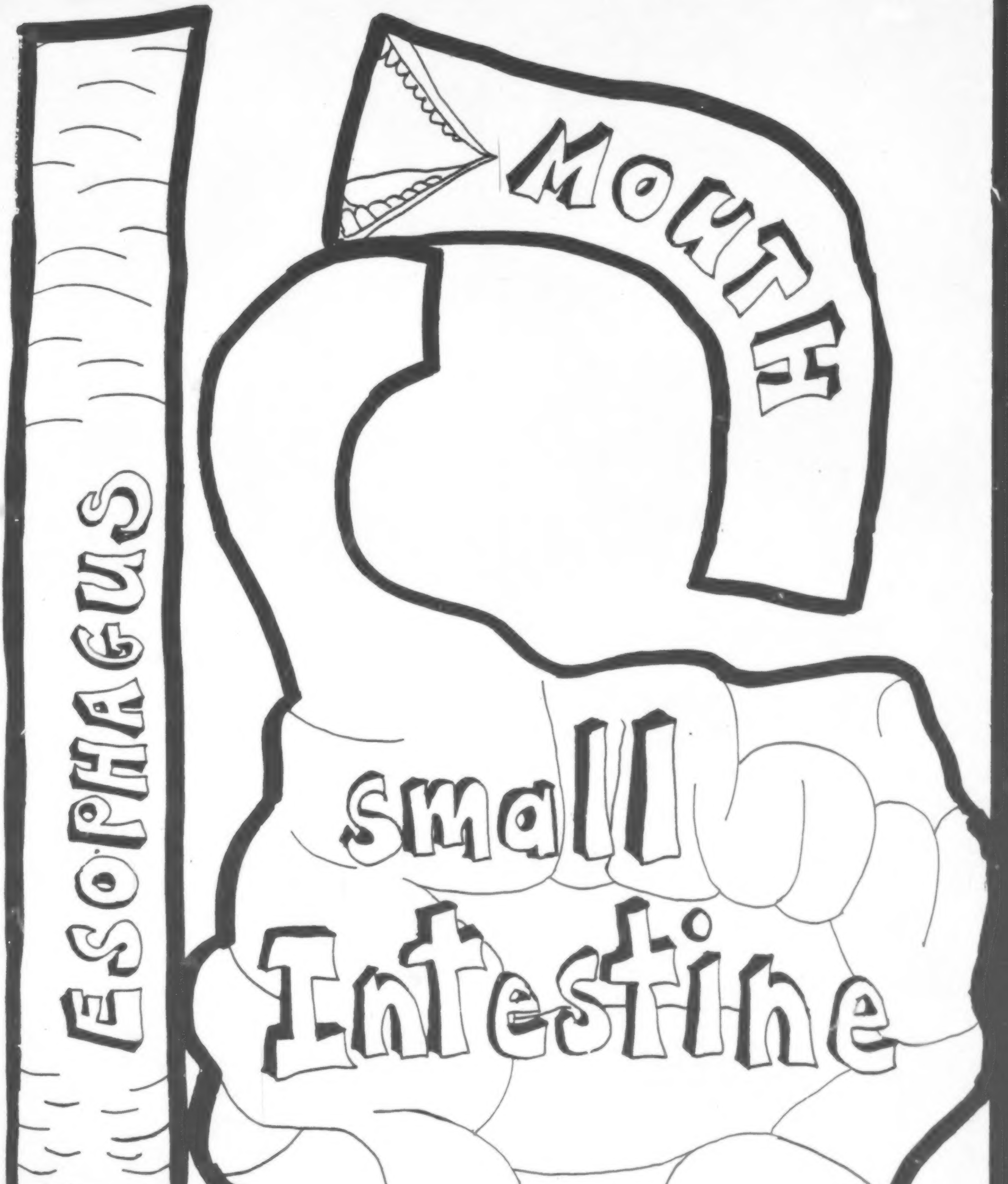
Stomach - holds food and churns the chewed food into a paste-like substance. At this point food no longer resembles its original form. Have students put hand on their stomachs. (Its located above the navel and to the left.) It's glossy and pink on the outside and shiny velvety on the inside.

Small Intestine - separates what our bodies can use from what isn't useful and will be discarded as waste. It completes the breakdown of food and then the remaining nutrients are absorbed into the body. The small intestine is a tube about 1½ inches in diameter, coiled like a pile of rope. Uncoiled it's more than 20 feet long. Have students put hand on small intestine.

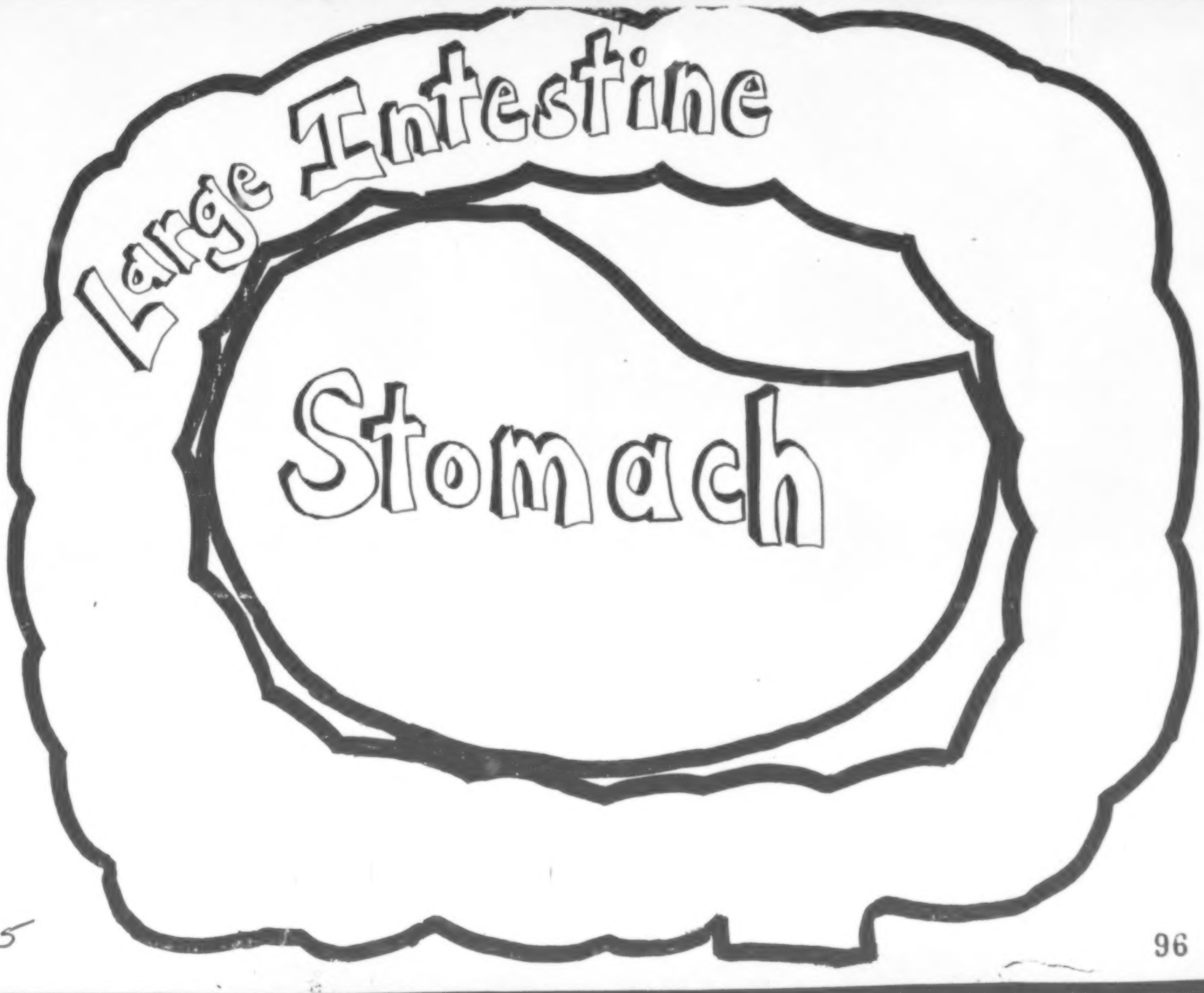
Large Intestine - reabsorbs water that was used for the digestive process and holds all of the indigestible food until our bodies eliminate them. It is only 5 feet long, and 2½ inches thick. It curls around the small intestine.

What is the purpose of our digestive system? Name the five organs of the digestive system and their functions. Compare how you would imagine a carrot looks when it is in your mouth and in your small intestine.

Adapted from the San Jose Nutrition Education Project, San Jose Unified School District


MOUTH
ESOPHAGUS
Small Intestine

3 5 0 94


Large Intestine
Stomach

holds undigested food particles until elimination

churns food into paste-like mixture

pushes food to the stomach

absorbs nutrients

Chewing

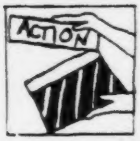
I Ate the Whole Thing

RUMBLE
RUMBLE

purpose

To reinforce the learning of the digestive system organs and their functions.

Materials: Two pieces of butcher paper (5 feet long); 2 marking pens; 2 sets of digestive system organs and labels (from page 350-352).



This lesson will use a relay race to reinforce the students knowledge of the digestive system. They will need to know the organs and their function in order to win the relay race.

Digestive System Relay Race.

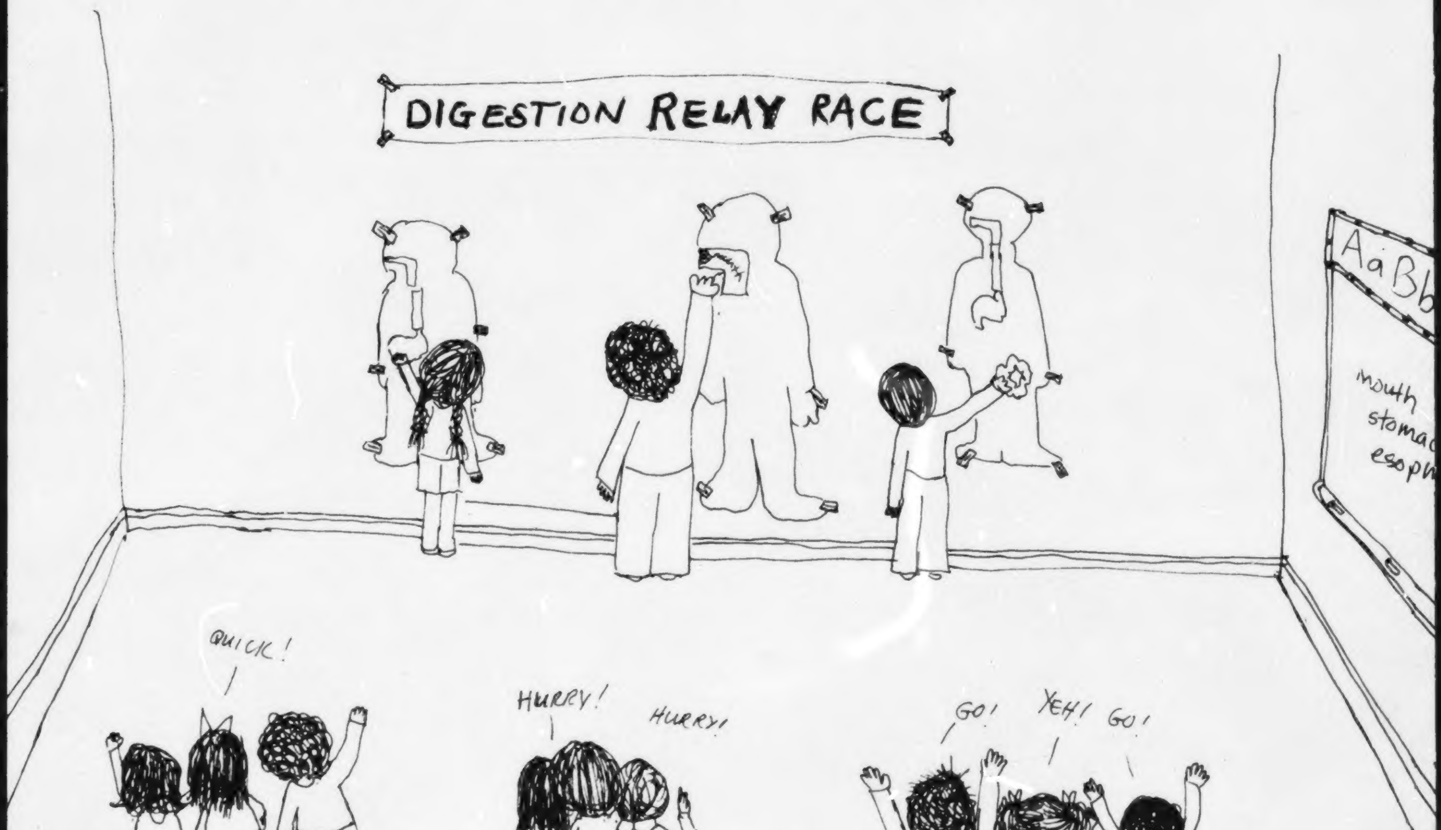
(1) Divide students into two teams.
(2) Give each team one piece of butcher paper and one marker.
(3) Have each team outline the whole body of one team member on the butcher paper. (Make sure the head is in a profile position.)
(4) Determine a space for the relay race. Lay each outline on the ground and have the team stand opposite their outline.
(5) The object of the relay is to have students place the digestive system organs on the body outline in proper place and then label each organ with the proper function. Let the students know they must put the organ and/or label in the proper place before they can tag the next runner.
(6) Conduct the relay in two heats. For the first heat give each team member one organ of the digestive system. (Extra team members can help decide whether the organ is in the correct place.) For the second heat, give each team member a function label to be placed next to the organ it describes.
(7) The winning team is the first team to complete each heat with the organs or labels in the proper place.

MORE

Where do the nutrients leave the digestive system? Describe the passage of food through the digestive system and what happens along the way. Why is it important for foods to be broken down into smaller particles?

Have students draw a self-portrait of the inside of their bodies putting their digestive system in proper order with correct labeling.

Adapted from the San Jose Nutrition Education Project, San Jose Unified School District


DIGESTION RELAY RACE
AaBb
mouth
stomac
esoph
QUICK!
HURRY!
HURRY!
GO!
YEH!
GO!

THE PORTABLE CHEMISTRY LAB

Introduction: Teacher Information

purpose

To demonstrate the chemical breakdown of food in the digestive system.

Background Information

Our digestive system is really a chemistry lab that works to break down foods so nutrients in the food can be used by our bodies. Chemicals-called enzymes-work in the mouth, stomach, and small intestine to change the food into substances that can be used by the body.

In the mouth, starches (which are complex carbohydrates) are simplified into glucose (a simple carbohydrate) which our bodies can absorb. In the stomach, proteins are simplified into their basic building blocks: amino acids. In the small intestine, the chemical breakdown of food is completed. This process takes place so that nutrients can be absorbed by the bloodstream and used by the cells. When the nutrients are in their simple form they will pass through the small intestine wall and into the bloodstream.

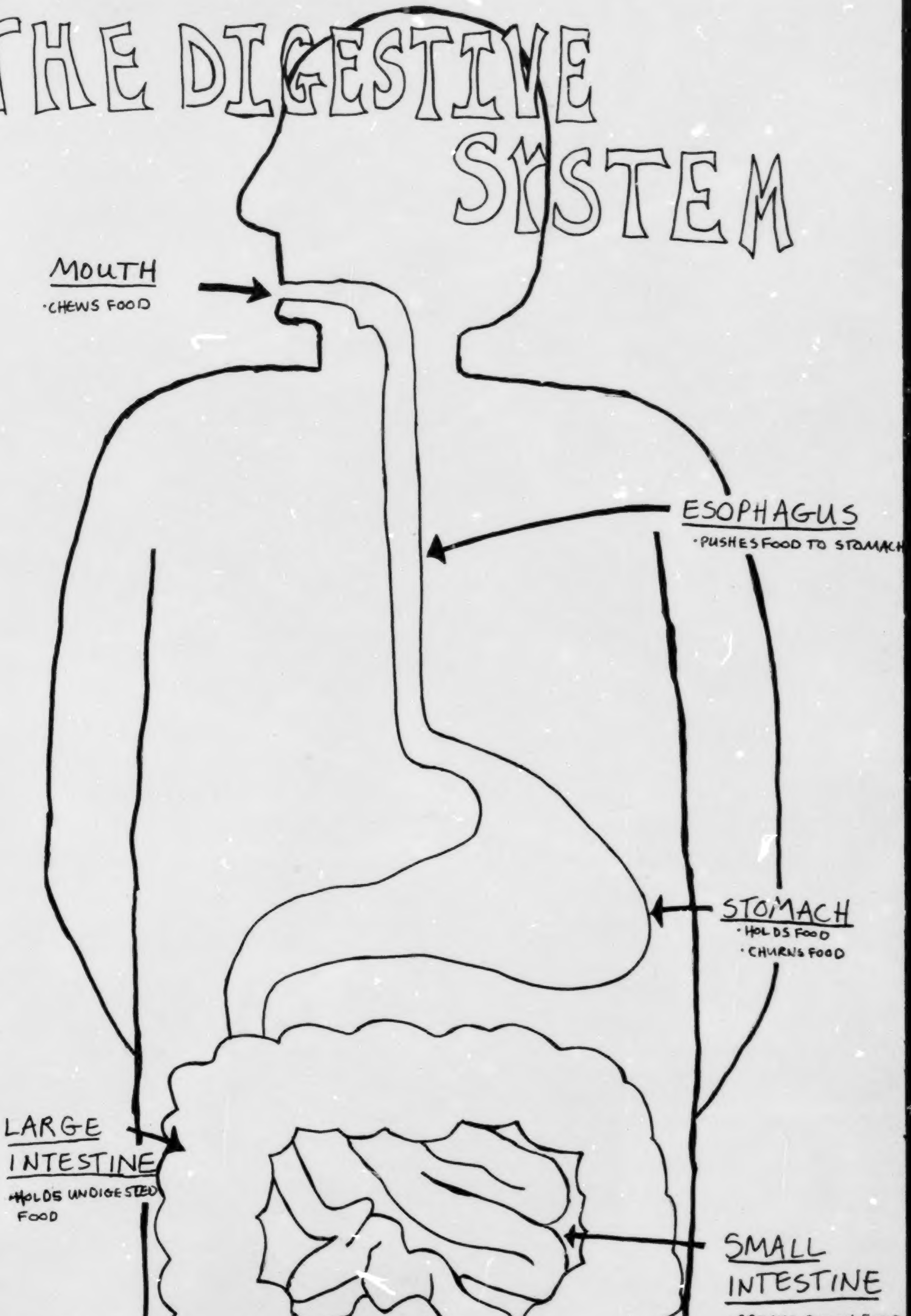
This lesson is divided into four parts.

Part I - examines the chemical reaction saliva has on carbohydrates.
Part II - demonstrates the muscle action of the esophagus.
Part III - examines the chemical breakdown in the stomach of proteins into amino acids.
Part IV - examines the passage of nutrients through the small intestine membrane into the bloodstream.

We suggest that students be familiar with the parts of the digestive system (see lessons p. 348 and 353); carbohydrates (see lessons p.325 and 326); and proteins (p.336). Also we suggest teachers use the method described on p.324 in carrying out the experiments.

WE ENZYMES BREAK DOWN THE FOOD IN HERE
YEP. ITS OUR JOB
FOODS
FOODS

THE DIGESTIVE SYSTEM


MOUTH
·CHEWS FOOD
ESOPHAGUS
·PUSHES FOOD TO STOMACH
STOMACH
·HOLDS FOOD
·CHURNS FOOD
LARGE INTESTINE
·HOLDS UNDIGESTED FOOD
SMALL INTESTINE
·BREAKS DOWN FOOD
·ABSORBS NUTRIENTS

The Portable Chemistry Lab

part I

purpose

To demonstrate the chemical breakdown of carbohydrates in the mouth.

Materials: Digestion system poster (p. 356); 2 clear glasses, water; 1 tsp. cornstarch; iodine; 2 stirrers; eyedropper; 2 test tubes; test tube rack; 2 tsp. boiled starch (mix 1-2 tsp. cornstarch in water and boil; use cold); Tes-tape.*

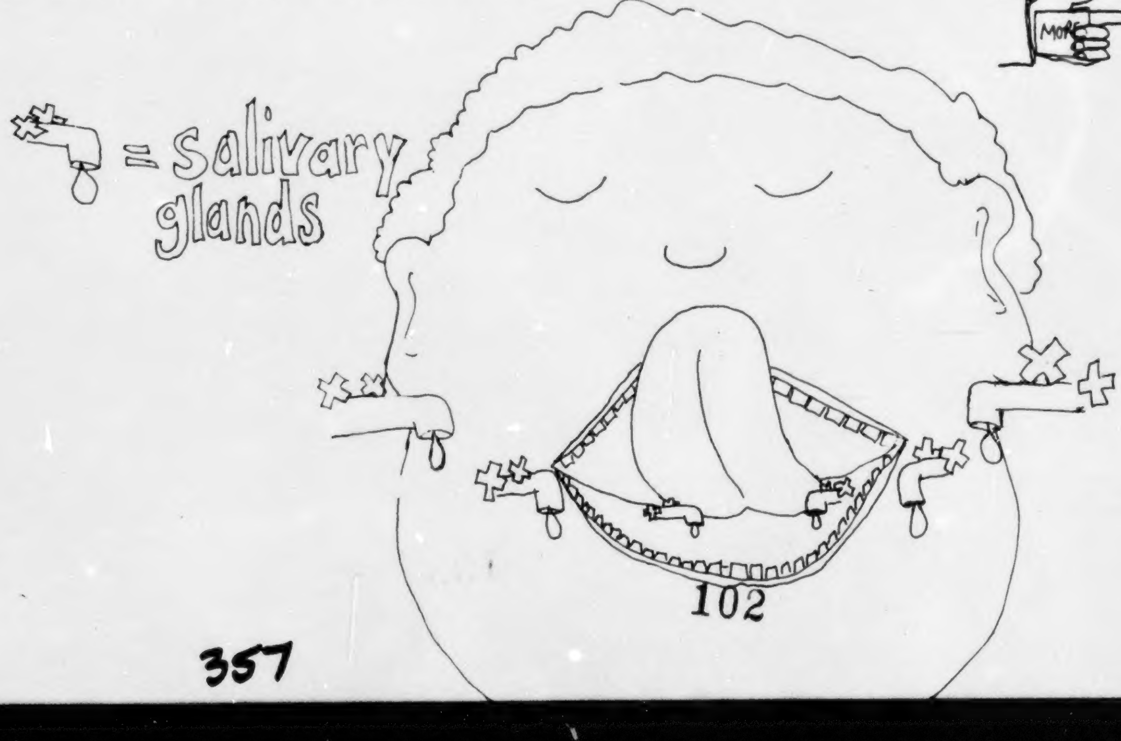
ACTION

In this lesson students will be introduced to chemical reactions by testing the effect of their saliva on starch.

*Discussion: Our digestive system is really a chemistry lab that works to break down foods so nutrients in the food can be used by our bodies. Chemicals-called enzymes-work in the mouth, stomach, and small intestines to change the food into substances that can be used by the body.

*The Mouth: In the mouth all food is broken down mechanically by chewing, and carbohydrates start to be chemically broken down into sugars. The mechanical change occurs by the teeth grinding the food. Saliva - the moisture in our mouth - moistens the food. Saliva is produced by the salivary glands. There are three pairs of salivary glands: one pair is located in front of the ears, another pair under the tongue, and the third under the lower jaw. They will produce the exact amount of moisture needed to wet the particular food.

MORE



*Starch to Sugar: Saliva also has an enzyme in it called amylase. Amylase causes a chemical reaction on starch (complex carbohydrate) to break it down to a simple carbohydrate (glucose). (Note: glucose is a form of sugar that is used by our bodies to provide energy to the cells. When we eat sugar directly - sucrose - it enters our bloodstream too quickly and gives us high energy followed by low energy. It also does not provide other nutrients, while starch foods do.) Do the following two experiments to demonstrate the change of starch to sugar in our mouths:

*With your tongue feel the bump near your second upper molar. This is where your salivary glands located by your ears secrete saliva into your mouth.

*Test the reaction of saliva on starch:

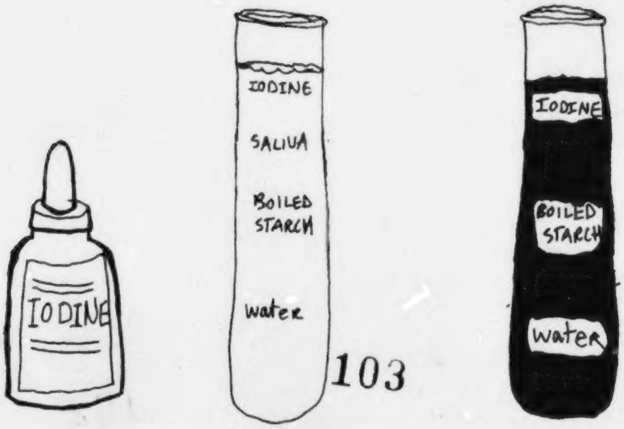
(1) Mix a teaspoon of cornstarch into glass of water. Use a second glass of water as a control. Put a drop of iodine into each. Note what happens to iodine when it comes in contact with starch. (It will turn blue-black.)

(2) Fill two test tubes with water. Add one teaspoon of boiled starch to each. Form a hypothesis of what would happen to the starch in your mouth.

(3) Add saliva to one test tube. Use iodine to test each test tube for starch.

(4) Make a conclusion. (The test tube without saliva should show positive for starch while the one with saliva will be negative.) You can test for sugar by using Tes-tape. Dip a one inch piece into the test tube. If it turns green, sugar is present.

What type of nutrients are chemically broken down in the mouth? What is the chemical we have in our mouths and where does it come from? Name two foods you eat that you would expect to become glucose in your mouth. How can you tell if starch is present?



The Portable Chemistry Lab

part II

purpose

To demonstrate the mechanical movement of food through the esophagus.

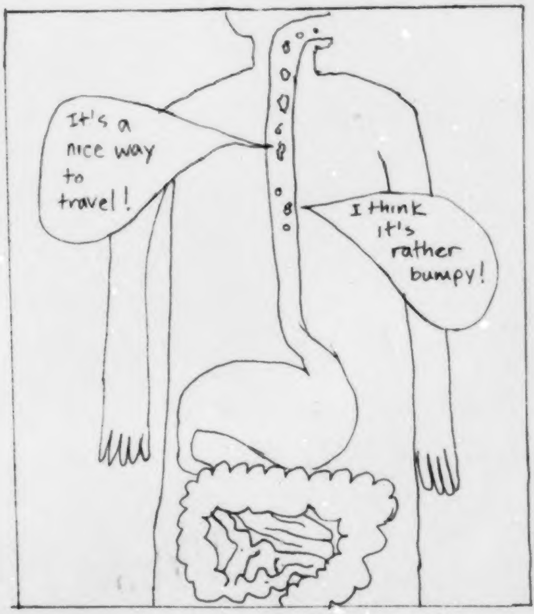
Materials: Digestive system poster (p 356); clear plastic tube (approx. one foot long); one marble that fits tightly in tubing.

Use this experiment to demonstrate how muscles move food through the tube between the mouth and the stomach--the esophagus.

*Place a marble in a clear plastic tube. The marble should fit tightly so it must be pressed to move it along. Press the marble through the tube. In the same manner food is held and squeezed through the esophagus by muscles. These muscles work automatically and their action is called peristalsis.

Because these muscles move food through our digestive system, it would be possible to eat while standing on our heads.

What is the purpose of the esophagus? Why is it important the muscles in the esophagus work automatically? What do you think reverse peristalsis means?


It's a nice way to travel!
I think it's rather bumpy!

The Portable Chemistry Lab

part III

purpose

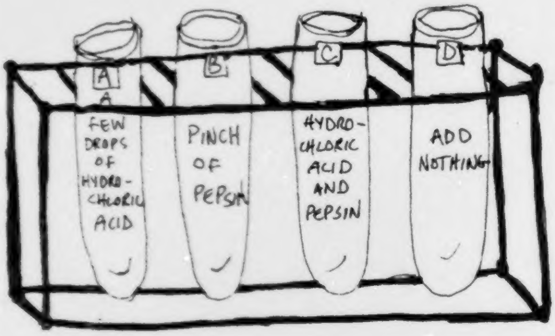
To demonstrate the chemical breakdown of proteins in the stomach.

Materials: Digestive system poster (p. 356); 4 empty test tubes labeled A, B, C, D; test tube rack; pipette; sodium hydroxide solution*[1]; copper sulfate solution*[2]; dilute hydrochloric acid*[3]; pepsin*[4] (small amount).

This experiment will demonstrate how hydrochloric acid and the enzyme pepsin work in the stomach to breakdown proteins. In the stomach food is churned into a paste-like substance and given an acid-bath to break it down further. The acid and the enzyme work to break down proteins into their simple form: amino acids. The stomach will also hold food for 3-4 hours; that's why it is so large. It can hold up to 2 quarts.

*Do the following experiment to test the reaction of the enzyme pepsin and hydrochloric acid on proteins. Both are present in our stomachs.

PUT SMALL PIECES OF BOILED EGG WHITE IN EACH TEST TUBE ALONG WITH 2 TABLESPOONS OF WATER. THEN ADD.....


A
A FEW DROPS OF HYDRO-CHLORIC ACID
B
PINCH OF PEPSIN
C
HYDRO-CHLORIC ACID AND PEPSIN
D
ADD NOTHING

NOW....... SET THE TEST TUBES ASIDE FOR ONE DAY!

[1] Be Careful! Sodium hydroxide (lye) is poisonous and can burn! Put one layer of pellets on the bottom of a 1 quart jar. Add 1 pint of water. Stir until all pellets are dissolved.

[2] Copper sulfate is poisonous. Dilute 20 grams in 62 mililiters (¼ cup) of water. (You should be able to borrow sodium hyroxide and copper sulfate from a junior high or high school science laboratory.)

[3] Hydrochloric acid - can be purchased as muriatic acid and then diluted with water: 1 part muriatic acid to 3 parts water.

[4] Pepsin - must be ordered in advance. See material list page 344.

MORE

(1) Form a hypothesis on what will happen to proteins when given a bath of hydrochloric acid and an enzyme pepsin (which are both present in our stomachs).

(2) Set up a control by testing egg white for proteins. Place a small amount of egg white in a test tube. Cover with a tablespoon of sodium hyroxide (lye). Add a few drops of copper sulfate solution. A purple color will form where protein is present.

(3) Label 4 test tubes: A, B, C, D. Put small pieces of boiled egg white with 2 tablespoons of water into each of the test tubes. Add the following:
    Test tube A - a few drops of dilute hydrochloric acid
    Test tube B - a pinch of pepsin
    Test tube C - both hydrochloric acid and pepsin
    Test tube D - add nothing

(4) Now set the test tubes aside for one day.

(5) Examine the test tubes the next day. What changes have occurred? Test all of the test tubes for protein by using the same test as in the control.

(6) Draw a conclusion for each test tube. The egg whites in test tube C should be digested and thus invisible. This is because the proteins have been broken down into amino acids--a simpler substance which can be used by our bodies.

On what nutrient does hydrochloric acid and pepsin act? What evidence is there that the protein in test tube C had changed? Why is it necessary for the protein to change form? Do you know why you may sometimes have a sour taste from your stomach?

I'M GONNA CHEW 'EM ALL UP!
PROTEINS

The Portable Chemistry Lab

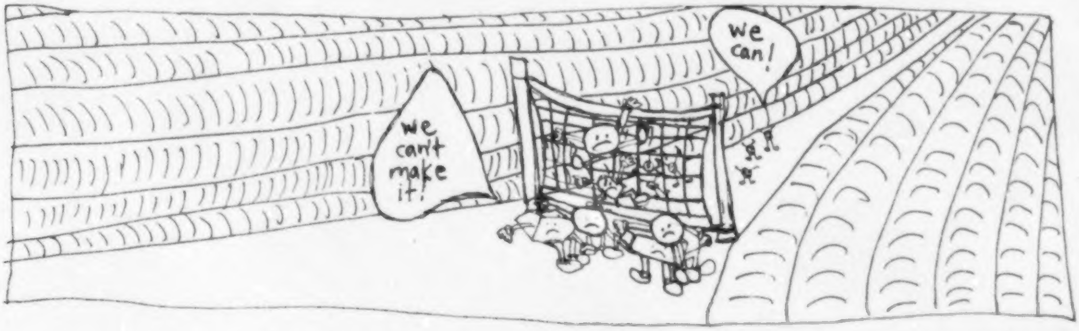
part IV

purpose

To demonstrate the ability of digested food to pass through the small intestine wall.

Materials: Digestive system poster (p. 356); 2 clear cups; water; 1 tsp. sugar; 1 cup boiled starch solution; 2 cups with 2 funnels; double layered paper towel to line each funnel; Tes-tape*

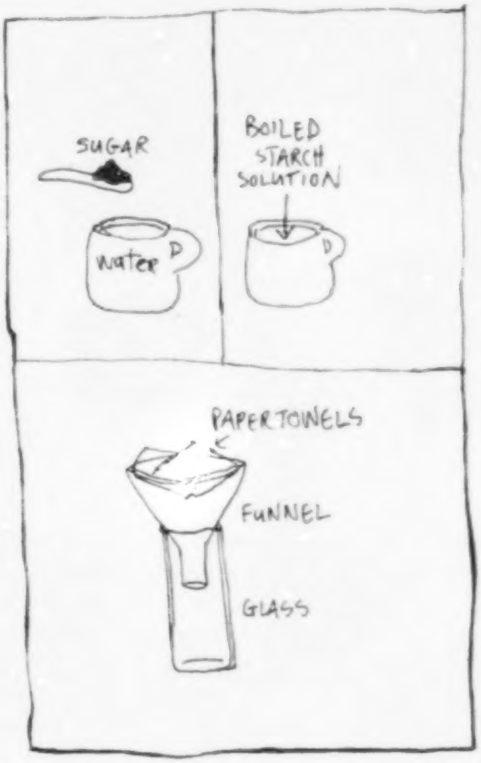
This experiment will demonstrate why it is necessary for food to be digested into small particles in order to leave the digestive system and enter the bloodstream. The final test of digested food is to pass through the intestinal wall. The intestinal wall is a permeable membrane that allows small, digested nutrients to pass from the digestive system into the bloodstream where the nutrients will feed all of the body cells.


we can't make it!
we can!

*Discussion. Food passes into the small intestine where enzymes work to complete the breakdown of carbohydrates (starches) and proteins. Enzymes also work on fats and change them into tiny droplets. The food in your small intestine will look like a liquid that contains amino acids from the proteins, digested fats called fatty acids and glycerol, and carbohydrates turned into simple sugars (glucose). As the foods breakdown, vitamin and mineral compounds dissolve in the liquid and do not need to be worked on by enzymes. All dissolved food materials pass through the intestinal wall into the bloodstream. In most foods, however, there are some particles that the enzymes cannot digest. This roughage and the wastes pass into the large intestine and from there leave the body.

MORE

*Do the following experiment to demonstrate how some foods pass through the intestinal wall while other cannot.



1) Form hypotheses on the ability of starch and sugar to pass through a permeable membrane.
2) Stir a teaspoon of sugar into a cup of water. Fill another cup with boiled starch solution.
3) Set a funnel lined with a double layer of paper towel in an empty glass. The paper towel represents the intestinal wall.
4) Slowly pour some of the starch mixture into the funnel.
5) Observe what happens. (The starch will not pass through the paper towel because it is too complex of a molecule to dissolve in solution and pass through a permeable membrane.)
6) Draw a conclusion.
7) Repeat the same experiment using the sugar water. Test for presence of sugar in the filtered solution and on the filter by dipping one inch of tes-tape paper into the solution. If the paper turns green, sugar is present.

How will food look in the small intestine? What happens to digested food in the small intestine? What happens to undigested foods? Compare what a digested food and an undigested food might look like. Why is the intestinal wall a permeable membrane?

Adapted from the San Jose Nutrition Education Project, San Jose Unified School District

The One Way Road

purpose

To introduce the circulatory system as the transportation system for nutrients to reach the cells.

In this lesson students will begin to explore the circulatory system by discussing arteries, veins, and capillaries.

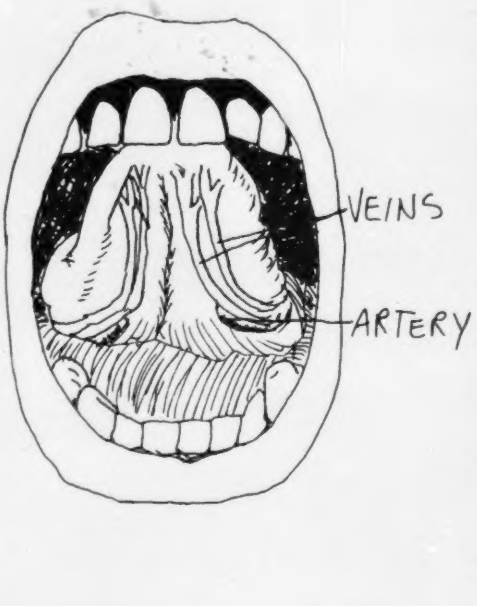
The circulatory system is our bodies' transportation system made up of all one-way streets. It is designed to carry food and oxygen from the heart to each of our cells, and wastes from our cells back to the heart. Our digestive system breaks food down into minute particles of glucose (sugar), amino acids (from proteins), and fatty acids so that they can be absorbed by the blood and be used by our cells--the microscopic building blocks that we are made of. How do the nutrients travel to the cells?

*Arteries, Veins, and Capillaries - There are three types of roadways in our transportation system. Arteries carry blood rich with nutrients and oxygen from the heart to the cells. Arteries are thick strong tubes that can stand the pressure of the blood rushing through them. The blood in them looks red because of the oxygen it is carrying.

*Capillaries - blood from the arteries enters the capillaries, very tiny blood vessels, each finer than a hair. Capillary walls are very thin to allow for nutrients and wastes to flow in and out to the cells. Thus each cell gets its nutrients through capillaries.

*Veins - return blood to the heart and lungs. They appear as blue lines under the skin. Blood flows in the veins is a lazy river compared to the arteries. They carry the wastes from the cells.

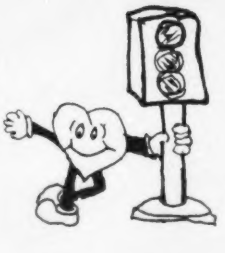
*Look under your tongue to see arteries, veins, and capillaries. (Use a mirror or look at a friend's.) Identify the arteries-thick pink lines; veins-thick blue lines; capillaries-tiny thin lines. What are their functions?



Compare three differences between arteries and veins. Why must capillaries have thin walls? Name two things blood carries to the cells.

Adapted from Blood and Guts by Linda Allison. © 1976 by Yolla Bolly Press.

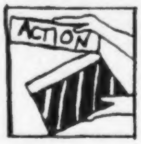
The Stoplight



purpose

To further explore the circulatory system by introducing the heart's function.

Materials: Stethescopes*; tennis ball with small hole cut in top, water.



In this lesson students will explore the heart's function through demonstrations.

Our strongest muscle is the pump which controls the flow of blood through our circulatory system--the heart. The heart pumps blood day and night. It is the size of your fist and is in the center of your chest between your lungs. Your heart is really two pumps side by side. The right side of your heart pumps blood to your lungs, where it picks up oxygen. The left-side pumps this oxygen-soaked blood to your body.

*Demonstrate our heartbeat by: filling the tennis ball with water; squeezing it so the water spurts out; relaxing your grip so the ball pops back to its original shape. Every time our hearts beat, the heart squeezes blood into the arteries, then it relaxes between beats and returns to its original shape. It refills with blood and the whole process is repeated.

*The heart has valves that open and shut to let blood in and out. Use a stethescope to listen to your heart. The lub-dub sounds you hear are the valves opening and closing.

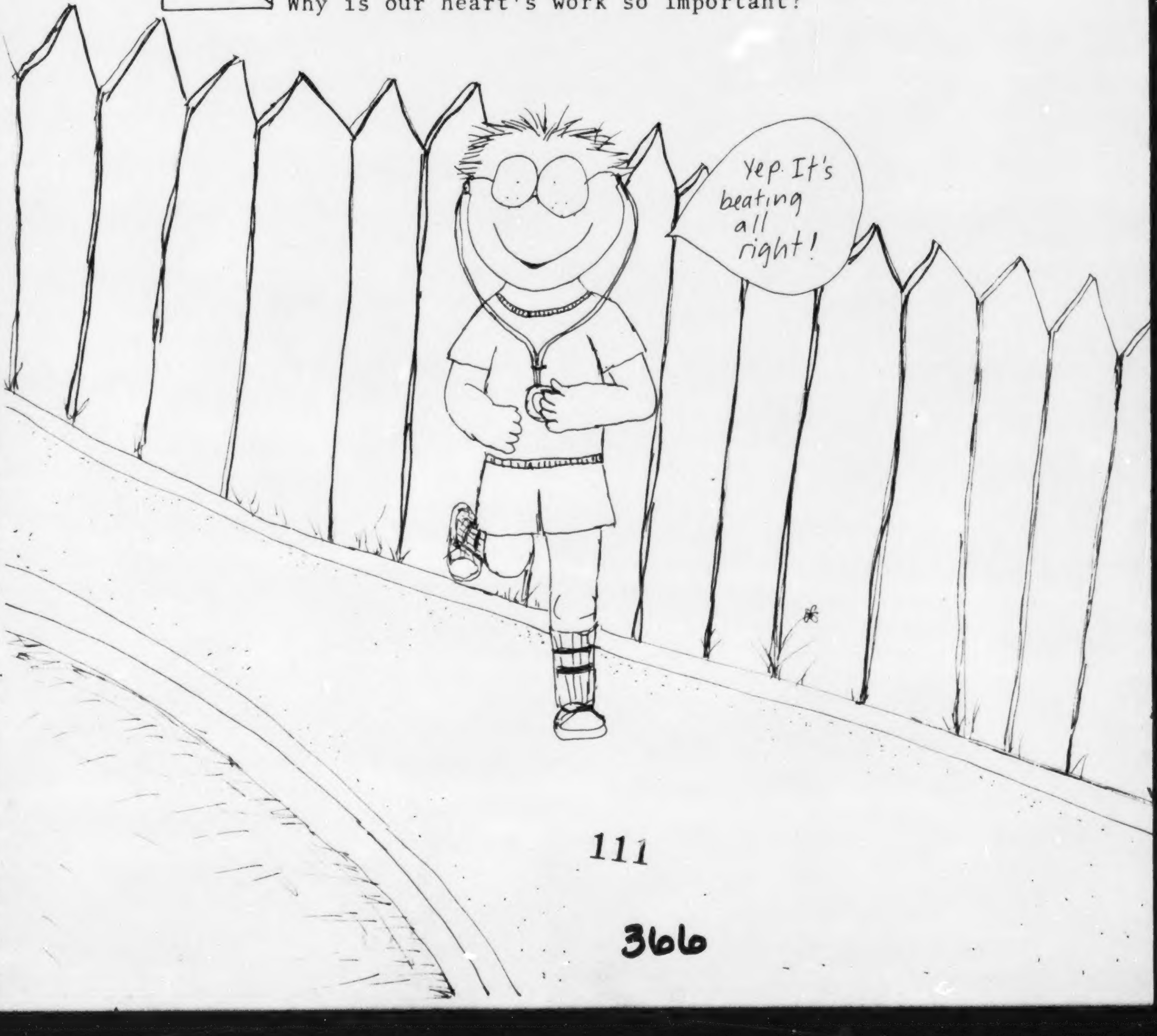
CELLS TIRED!

MORE

Count the number of beats you hear in a minute. Now have the students run, and once again count the beats. How and why has it changed? (With exercise your cells are burning up more fuel and oxygen so the heart pumps more nutrient and oxygen-rich blood to the cells.)

*Your pulse is the feeling of the blood starting and stopping as it rushes through your arteries. You can feel this when an artery is close to the skin. Put your second or third finger on your wrist and feel your pulse beat. Compare it with your heart beat. How and why are they similar?

Why is it called a circulatory system? Trace the path food travels from your mouth to a cell. Why does your heart beat faster after you've exercised? Why is our heart's work so important?


Yep. It's beating all right!

My Basic Ingredient

purpose

To introduce the cell as the basic building block of all living things.

Materials: One onion, knife, 2 compound microscopes;* toothpicks, glass slides and cover glasses; eyedroppers, iodine, cell posters (from pages 369-372), journal and pencils.

ACTION

In this lesson students will use microscopes to look at different forms of cells.

After our food is digested, and the nutrients enter the bloodstream, where do the nutrients go? The nutrients feed each individual cell in our bodies. All living things are made up of the same basic unit--cells. Cells come in different sizes and shapes; however whale cells and mouse cells are about the same size. Each cell performs one function. They work together in teams. For example, a cell might move oxygen around the body, in the blood. Other cells meanwhile are taking care of fuel supply, communications, and waste removal. There are about 100 trillion cells in our bodies!

All our cells are constantly taking in chemical fuel (our nutrients) and burning it to produce the energy for us. Thus the nutrients are what makes a cell function properly--and therefore keeps us functioning properly. Some cells require more of one nutrient than other cells require. Blood cells require large amounts of iron while the cells of bones and teeth require large amounts of calcium.

*Look at cell posters. Examine differences and similarities. All cells have a nucleus and a cell membrane. The nucleus directs all cellular activity while the cell membrane regulates the materials that pass into and out of the cell.

*Cut an onion in half. Pull off an inside layer. On the outside of this layer there is a transparent

N
Yum Yum
Nutrients
we love 'em!
tasty!

MORE

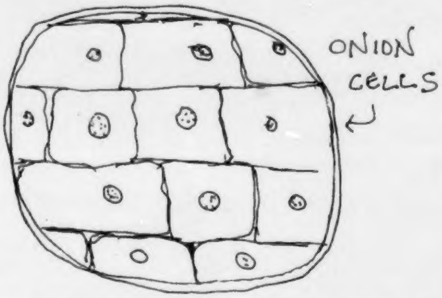
skin as thin as tissue paper. Pull off a small piece of this skin and place it in a drop of water on a glass slide. Place one drop of iodine on the slide. Flatten the tissue and place a cover glass over it.

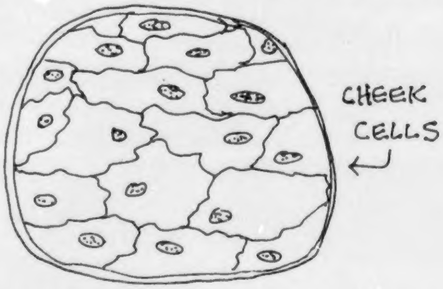
Observe the onion cells through the low power lens. The cells will be seen fitting together like bricks in a wall. Each brick is one cell. Now look through the high power lens. Each cell will have a dark spot inside of it. This is the nucleus. Each cell also has two thin lines around the outside. The inner line is the cell membrane, the outer is the cell wall. It may be difficult to distinguish the two structures. All cells have a cell membrane, while only plant cells have a cell wall.

*Gently scrape the inside of your cheek or lip with a toothpick. With a knife, scrape some of the white material on the toothpick into a drop of water on a glass slide. Spread the material out in the water. Add a drop of iodine and lay a cover glass over it. Examine the material under the low power and the high power lenses of the microscope.

*Discuss what is seen in the microscope. Are the cells of the cheek different from the cells of the onion? Can the nucleus be seen? A cell membrane? A cell wall?

*While looking in the microscope, sketch the onion cell and the cheek cell in your journals. Label the parts you can identify.



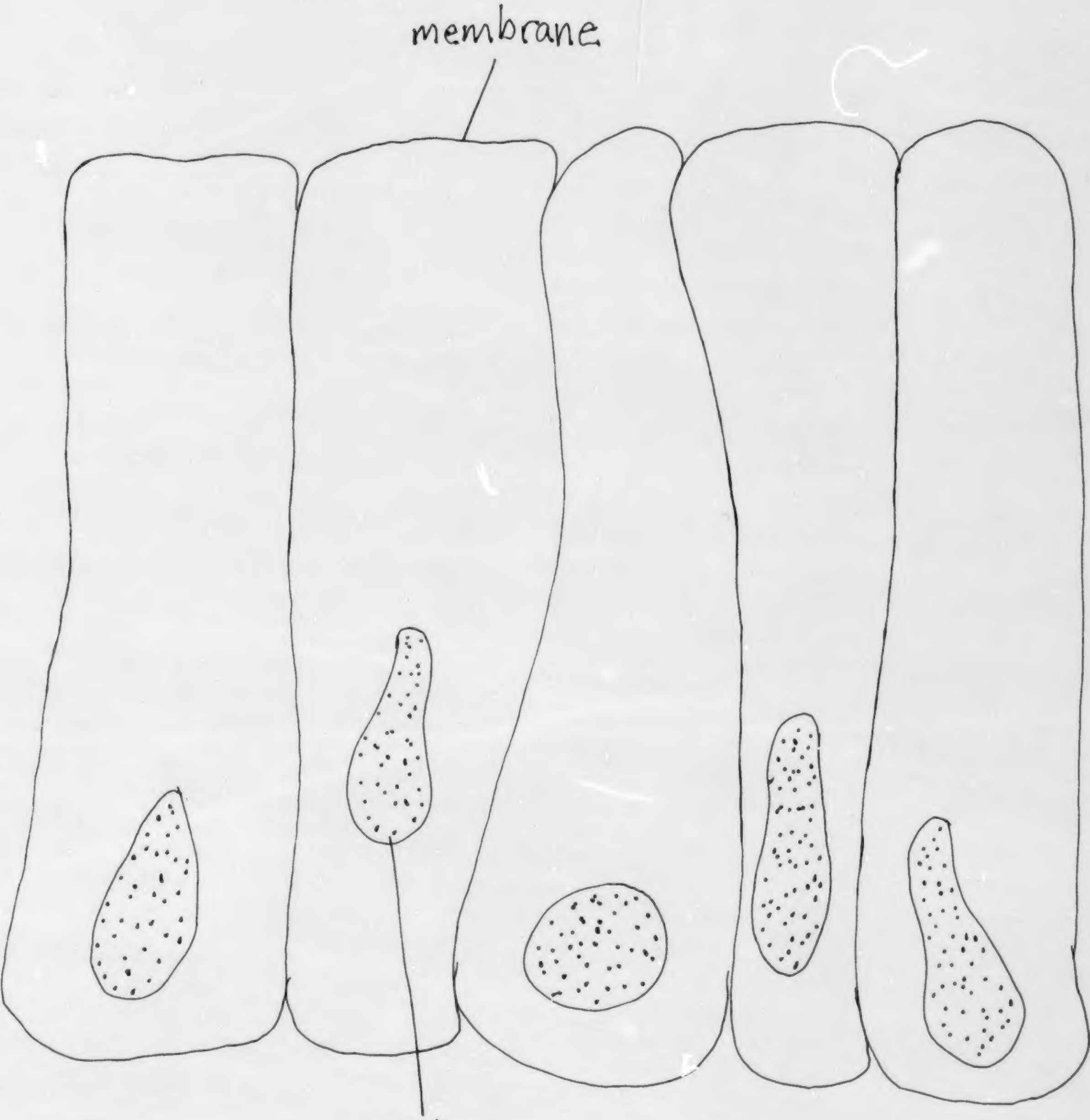


What are cells? What kinds of things have cells? What kinds of things don't have cells? What types of things do cells do? Identify two parts of a cell that all cells have. How do cells use nutrients?

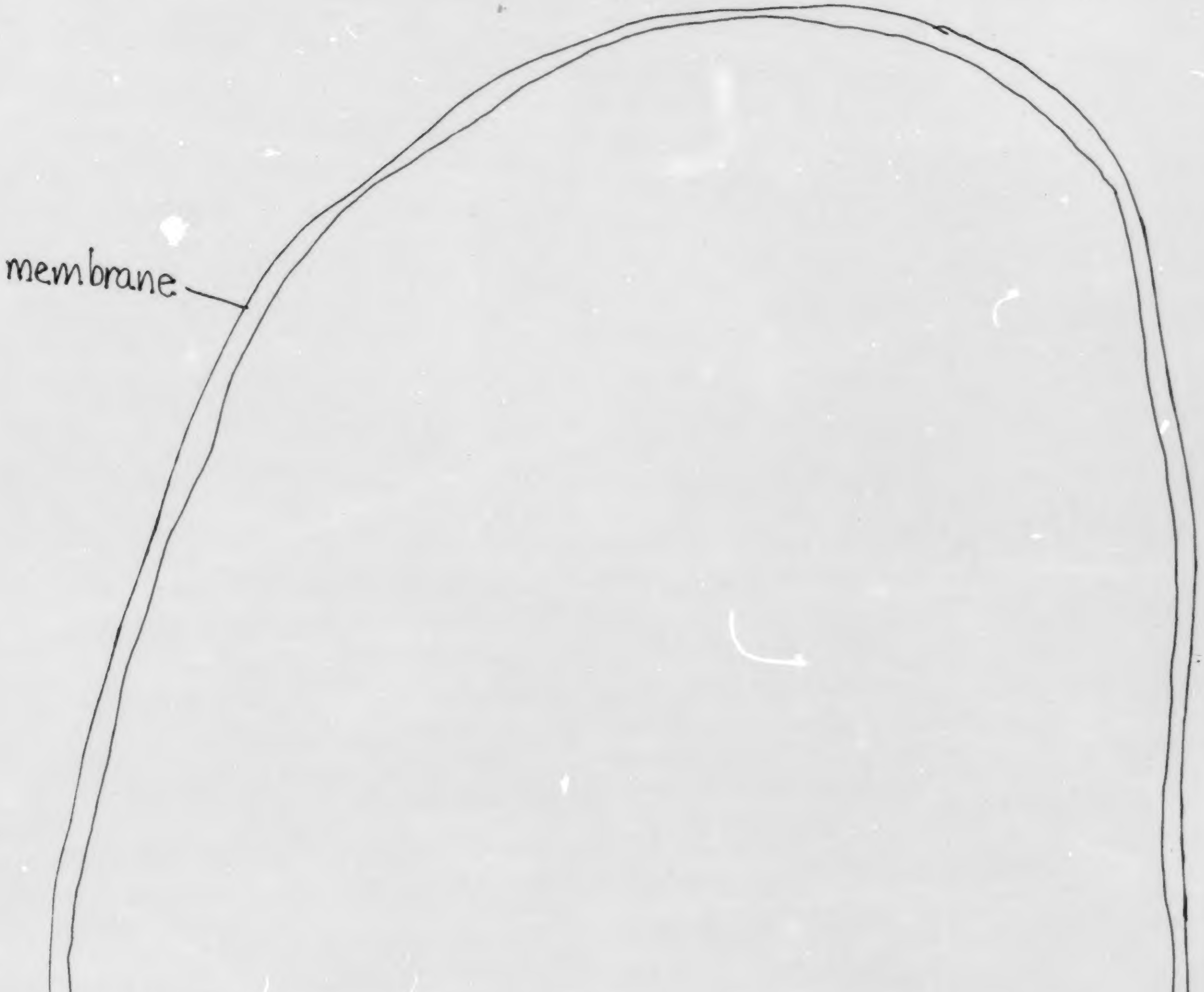
It is possible to use prepared cell slides for the students to observe.

Adapted from San Jose Nutrition Education Project, San Jose Unified School District

~SKIN CELLS~

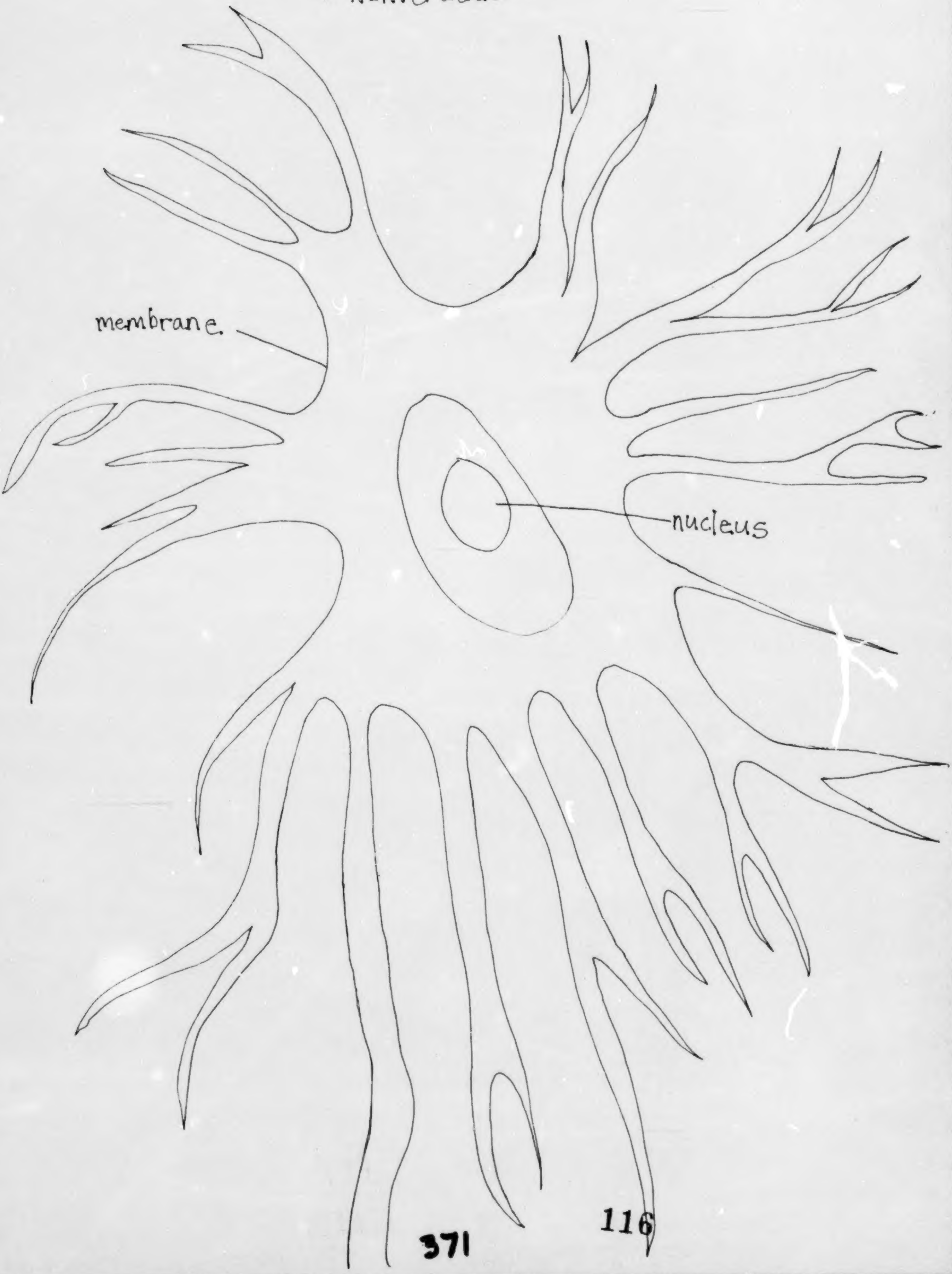

membrane
nucleus

~BLOOD CELL~

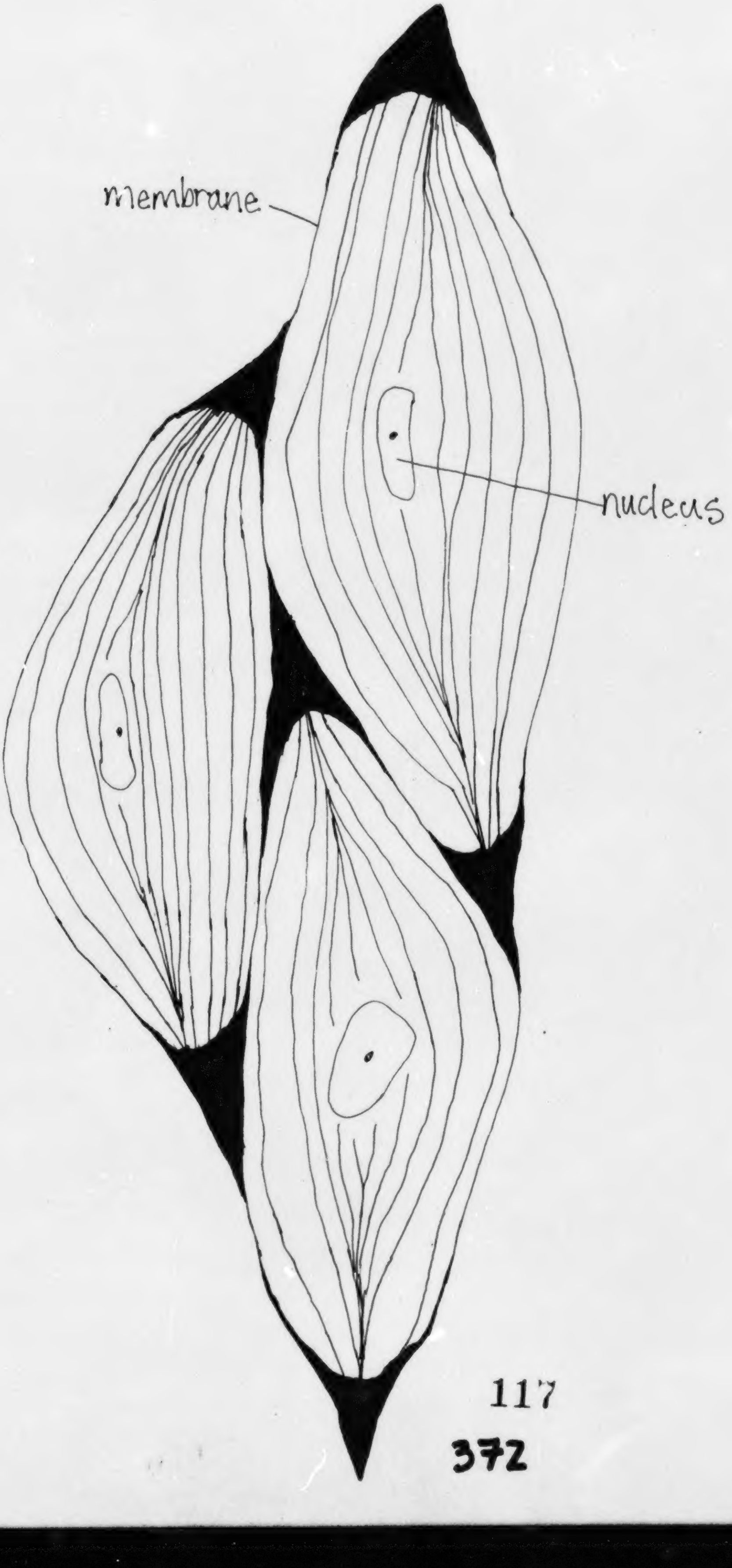

membrane
nucleus

370 115

~NERVE CELL~


membrane
nucleus

~MUSCLE CELLS~

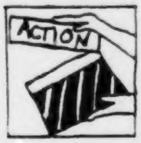

membrane
nucleus

It's All Mish Mash to Me

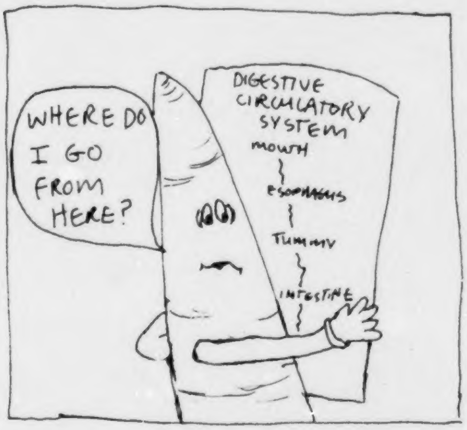
purpose

To incorporate the digestive and circulatory systems.

Materials: Copies of outline page 374 (one for each student), crayons, chart of digestive and circulatory systems (from encyclopedia).



In this lesson students will tie together the purpose of the digestive and circulatory systems to break down foods into simple nutrient forms so they can be transported through the blood to the cells. The cells then use the nutrients to give us energy, keep us healthy, and help us grow.

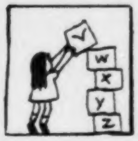


*Using the outline on page 374 help students use their imaginations to draw the path of a carrot as it travels through their bodies. They should include:

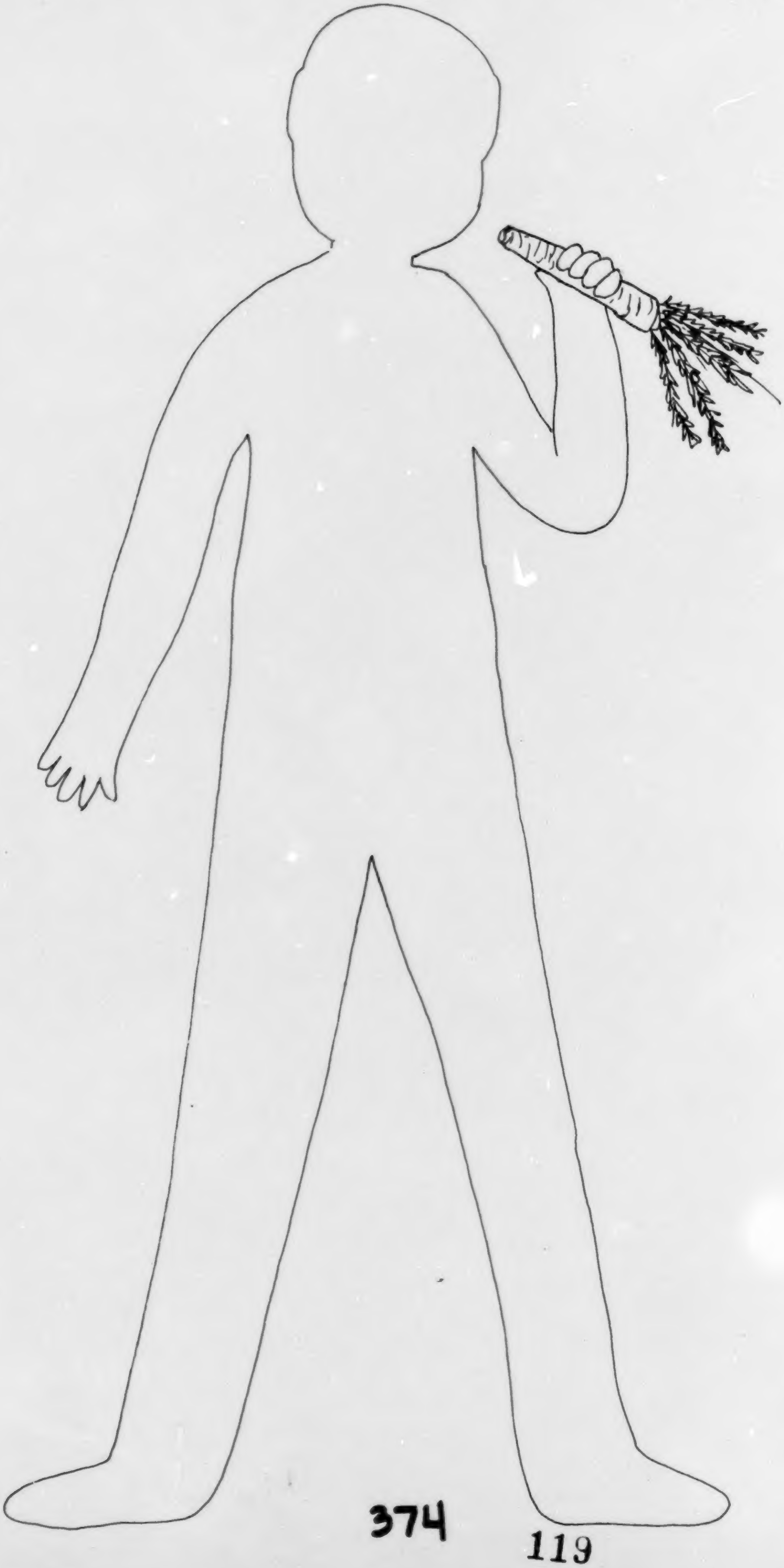
1) the parts of the digestive system
2) veins, arteries, capillaries
3) heart
4) the carrot's destination - cells

*Show them a chart of the digestive and circulatory system. We each have about 60,000 miles of blood vessels.

From what organ do nutrients leave the digestive system and enter the bloodstream? Why do nutrients enter the circulatory system? What do cells do with the nutrients. Why is it important to eat foods that give us all the nutrients we need?



As a follow-up to this unit, return to the Basic Four concept to reinforce the idea that we must eat a variety of foods to give our cells all the nutrients we need. One possibility would be to prepare a snack that contains all four food groups and discuss what nutrients they are giving the cells.



374

CONSUMERISM
C

We live in a fast-moving society that has grown dependent upon convenience foods. Over half of the food products on supermarket shelves have been invented in the last 25 years. Although we may know which foods are good for us and which are not, it is difficult to avoid the influences of advertising. We must virtually become detectives to research information about the many foods available to us.

This unit culminates our effort to have students become aware of why and what they eat. It connects the Nutrition Section with their everyday world of food shopping with their parents, opening cans of food, and watching TV. Skills from reading and graphing to group cooperation are incorporated to synthesize the students' knowledge of nutrition into applicable skills. Lessons in this unit are taught to 3rd, 4th, and 5th graders at Life Lab.

Lesson Titles	Recommended Grade Levels
Supermarket Snoop	4 - 6
Yes, It's Got No Bananas	3 - 6
You Are What You Eat	3 - 6
The $1,000,000 Orange	4 - 6
This Little Lettuce Went To Market	4 - 6
The New Improved Madison Avenue Diet	2 - 6
Try It, You'll Like It!	4 - 6
Buy Me! Buy Me!	4 - 6
Feast Or Famine	4 - 6

Special Materials & Where To Find

Chemical Cuisine Chart - Is a color poster that describes food additives and color codes them according to their safety or danger.

Order from - Center for Science in the Public Interest, 1755 "S" St., NW, Washington, DC 20009. $2.50.

*The above material is listed to assist you in locating it. All materials are listed with each lesson and most are readily available.

Supermarket Snoop

purpose

To introduce 'smart' consumerism.

Materials: journal, pencil

In this lesson the class will take a field trip to a supermarket and students will use research skills to gather information on products available in supermarkets. This information will inform them of the abundance of what is available to them as an American consumer. The information gathered can be analyzed in lessons throughout this unit.

*Discuss consumerism. A consumer is someone who keeps and uses up things offered for sale, such as food, services, or clothing. We are all consumers. We choose what we consume whether it be a certain TV program, a hamburger, a candy bar, or a new shirt. However, there are things that can influence our choice: advertising, parents, friends, pretty packaging, health, etc. To be good consumers we must learn as much as we can about the products we are consuming, and realize what influences our choice, and then make a responsible decision as to what we will and won't consume.

*Plan a field trip to a local supermarket. If possible arrange a time for the students to interview the manager. Be sure to establish time for students to do their own investigations in the store.

*Supermarket investigation. Have the class prepare a list to investigate at the store. Decide which questions they will answer by investigating themselves, which they will ask the manager, and which they will do both. Suggested investigations:

1) How many products are sold in the store?
2) How many products are in their original form (not processed)?
3) Compare the price of a non-processed food with that food in a processed form (1 lb. potatoes - 1 lb. potato chips).
4) How does the store try to draw your attention to certain products?

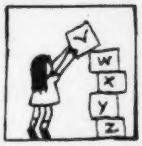
5) Which is the cheapest jar of peanut butter?
6) Which size and brand of peanut butter is the cheapest per ounce?
7) How many different breakfast cereals are sold?
8) How many of the breakfast cereals have 'sugar' as the first or second ingredient?
9) List the different materials that are used to package foods.
10) List products you can find from different countries.
11) List ten products you think will be on the shelves little kids can reach. Are they?
12) What kinds of things are sold in the bins nearest the cash register? Why?

*Discuss the information students gathered.

*Make a class list of what they need to know to be good shoppers.

FRESH
VEGETABLES

Why are you a consumer? Name one item you consume. What are three things that influence your choice of that item? Why do you think there are so many products in a store? Make up a checklist that would help you be a good shopper.



*Invite a consumer advocate to class. (Many county/city governments have a consumer division.) Find out what s/he investigates; what consumers can do if they have a complaint.

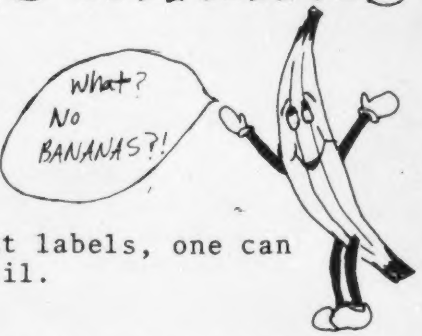
*Visit other types of food stores: coop, farmers' market. Compare available products, prices, packaging, atmosphere.

*Research the history of supermarkets. (They started in the 1930's. Where did people buy food before?)

*Choose three different countries. Research what people in those countries eat and how they buy their foods.

*Discuss being a producer vs. being a consumer. If you eat from your own garden you're a producer. Make a list of producers and consumers.

Yes, It's Got No Bananas


What?
NO
BANANAS?!

purpose

To introduce package label reading.

Materials: Variety of packages with ingredient labels, one can 'banana' pudding, journal and pencil.

ACTION

In this lesson students will investigate the different information found on packaged foods, and start to analyze the content of food.

The government requires all package labels to have: the name of the product; the variety, style, and packing medium; weight of what's in the package; the name, city, state, and zip code of the manufacturer, packer, or distributor.

Most foods must list all of the ingredients used in the package. These ingredients will be listed in order of quantity: what was used most must be listed first, and the second, next, and so on.

Many foods also have nutritional information that tell how much of specific nutrients you get from one serving of that food. If we learn how to use all of this information, it can help us make decisions as to whether certain foods are really good for us.

THIS IS
LEMONADE?
INGREDIENTS:
BHA, BHT,
TRISODIUM
BENZATE,
YELLOW DYE
# 4, 5, 9, 52,
SUGAR, MORE
SUGAR, LEMON
JUICE EXTRACT

*Begin by holding up the can of banana pudding. Have students list the ingredients they think are in the pudding and number them in order of most to least quantity. Discuss their lists.

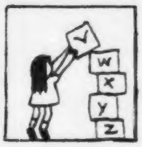
Slowly, read the banana pudding ingredients to the group, allowing them to discover that there are no bananas in the can. Are they surprised? How can this be called banana pudding if there are no bananas in it? Are there ingredients

MORE

in the pudding they never heard of? How do they feel about eating food that is made up of ingredients they know nothing about?

*Have students find the ingredient label on the remaining packages. Have them name their primary ingredients. Does their food contain: sugar, dextrose, glucose, corn syrup, sucrose? These are all sugars that have been added to the product. Have them compare their ingredients with the name of the food product. Is it what they thought it would be? Can they tell from the ingredients whether the food is good for them or not? Is there more they want to investigate?

Why is it important to know the ingredients of packaged foods? If you read the label of everything you ate, do you think your eating habits would change? If you were not allowed to eat salt in your diet, how would labels help you?



Set up a display of labels students bring in from home. Have them circle in red any ingredient that means sugar.

WE'RE HAVING MSG WITH BHT FOR DINNER!

You Are What You Eat

purpose

To incorporate reading skills and discuss use of chemical additives in packaged foods.

Materials: Cookbook recipes and corresponding packaged food labels, Chemical Cuisine Chart*.

ACTION

In this lesson students will use reading skills as they review ingredients on packages and in recipe books. They will also practice chart reading as they use the Chemical Feast Chart to determine the danger of certain additives to our health.

*Compare the ingredients of cookbook recipes with package label ingredients of the same food.

Example:

HOMEMADE LEMONADE
water, lemons, sugar

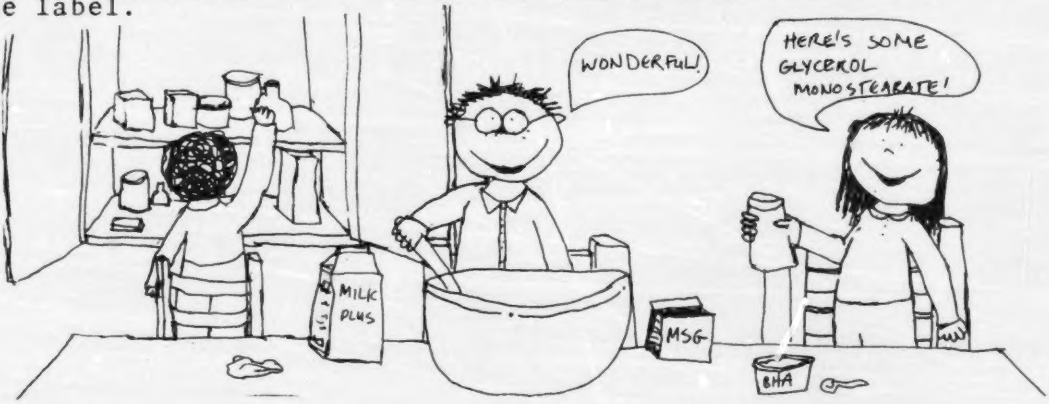
INSTANT LEMONADE FLAVOR DRINK MIX
sugar, citricacid, trisodium citrate, natural lemon flavor, modified corn and tapioca starches, partially hydrogenated coconut oil, vitamin C, artificial color, tricalcium phosphate, BHA

MORE

*Discuss the additives found in packaged foods. Packaged foods were developed for people's convenience. But to have foods ready in an 'instant', and to keep them long-lasting on the shelf, chemical additives are put in the foods. Some add color. Some add flavor. Some are preservatives used so the food will last a long time. Some affect the texture of what you buy.

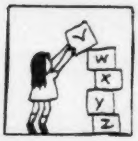
The government has to approve what food manufacturers add to foods. Except research to test the additives is slow. And sometimes additives have been proved unhealthy for us after they've been used in foods for years.

You can be sure if a food has no additives if it says: No preservatives, No artificial color, No artificial flavor on the label.



*Have students choose additives from ingredient labels and find them on the Chemical Feast Chart. Discuss the different additives. What do they do? Are they necessary? Are they safe?

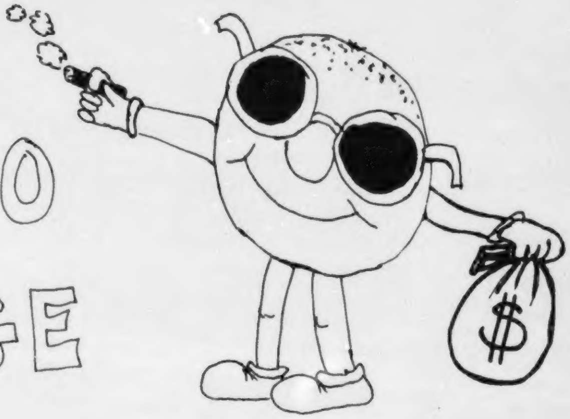
Why are the ingredients in home-made apple pie different than frozen apple pie? Why are there additives in packaged foods? Is it important for your health to be aware of what ingredients are in the foods you eat? What are three things you would like to change about what you eat?



*Create a matching game. Have students match packaged food ingredients with the final product.

*Make a Banana-Carob Smoothie with students. (See recipe page 407.) Discuss whether you need additives. Have students make up the ingredients label for the smoothie.

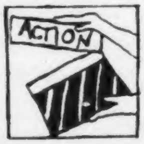
THE $1,000,000 ORANGE



purpose

To demonstrate the increased cost of food as it is processed.

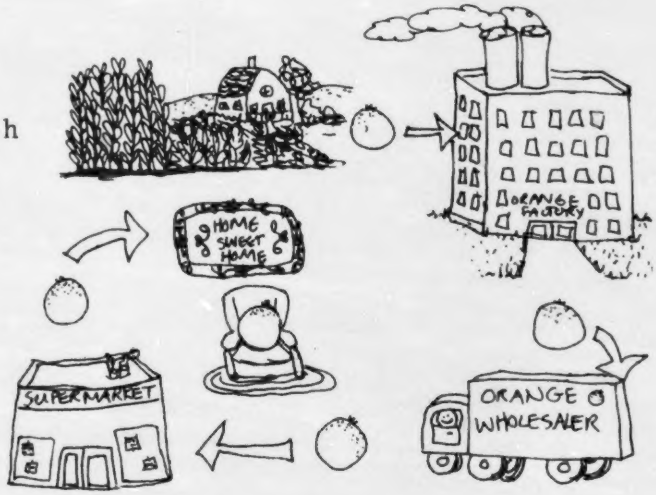
Materials: One orange (with price), 1 can frozen orange juice (with price), fresh oranges (½ per student), hand juicer, bowl, pitcher, small paper cups (1 per student), masking tape, coffee stirrers (1 per student), freezer space, knife, cutting board, measuring cup.



In this lesson students will make orange juicicles to learn the steps and costs involved in food processing from original form to eaten form.

*Divide the class so that each student has a job:

- Producer - farmer
- Processors - slicers
  - juicers
  - mixers
  - packagers
  - labelers
- Transporter - truckers



*Have one person be a recorder. Draw on the blackboard the following chart. The recorder will fill in the chart as each step progresses.

JOB	PROCESS	MATERIALS	LABOR	ENERGY	COST

MORE

*Take the class through the process of making orange juicicles. With each step discuss the materials, labor, and energy that is involved. Then have the processor at each step determine how much s/he will charge for his/her process. The recorder should record this information, and then upon completion add up the final cost of the orange juicicles.

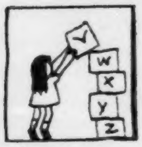
*Steps:

(1) Farmer - grows and harvests oranges. Trucks them to processor.
(2) Slicer - cuts oranges in half until there is enough for half per person.
(3) Juicer - squeezes half orange into bowl.
(4) Blender - stirs in 1/3 cup of water to juice of half orange.
(5) Packager - pours mixture into small paper cup.
(6) Labeler - puts tape on each cup with students name and ingredients label.
(7) Truckers - carry orange juicicles to freezer.
Insert sticks after 20 minutes.

*Discuss what price the class would sell their product for in order to pay their costs and make a profit. Why would it be cheaper to buy the ingredients and materials and make it at home?

*Enjoy the orange juicicles.

Why is it more expensive to buy processed foods then unprocessed foods? Name three advantages for you when buying processed foods. Name three disadvantages. Describe how having so many processed foods affects our society in terms of jobs, costs, energy use, health. Is the cost of food related to nutritional value?



*Research food preparation in an earlier culture such as the Indians. Compare it with ours.

*Have students investigate prices of foods in original form and the same product in processed forms. How many processed products can they find for one original food?

*Research the actual breakdown in cost of a food product from farmer to store. Which is the most expensive step? The least?

Adapted from Peanut Butter and Pickles, Humboldt County Office of Education

GOOD TO EAT AND GOOD FOR YOU, TOO!
C

384

This Little Lettuce Went to Market

purpose

To investigate the steps from farmer to supermarket in marketing produce.

Materials: Seasonal list of locally grown fruits and vegetables (available from County Agricultural Extension, or Agriculture Commissioner); grocery store newspaper ads.

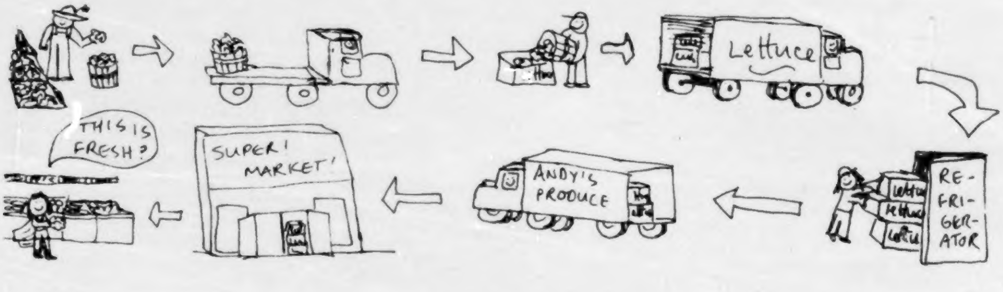
ACTION

In this lesson students will investigate the roads to market of local produce vs. produce grown far away. The lesson can be enhanced by inviting a farmer and a supermarket produce manager to class.

*Review with students a list of locally-grown fruits and vegetables and their seasons.

*Divide class into small groups. Give each group a grocery store ad from the local newspaper. Have students list fresh produce that is advertised and where they think it was grown.

*Have students take one item grown locally and one transported from far away and list the different steps each had to go through to get from harvest to the supermarket. What are the costs and energy uses with each step?



*Invite a farmer to class. Ask him/her how s/he sells what s/he grows. Have them trace the steps from the farm to the market, and the costs along the way. How much of his/her produce is sold locally?

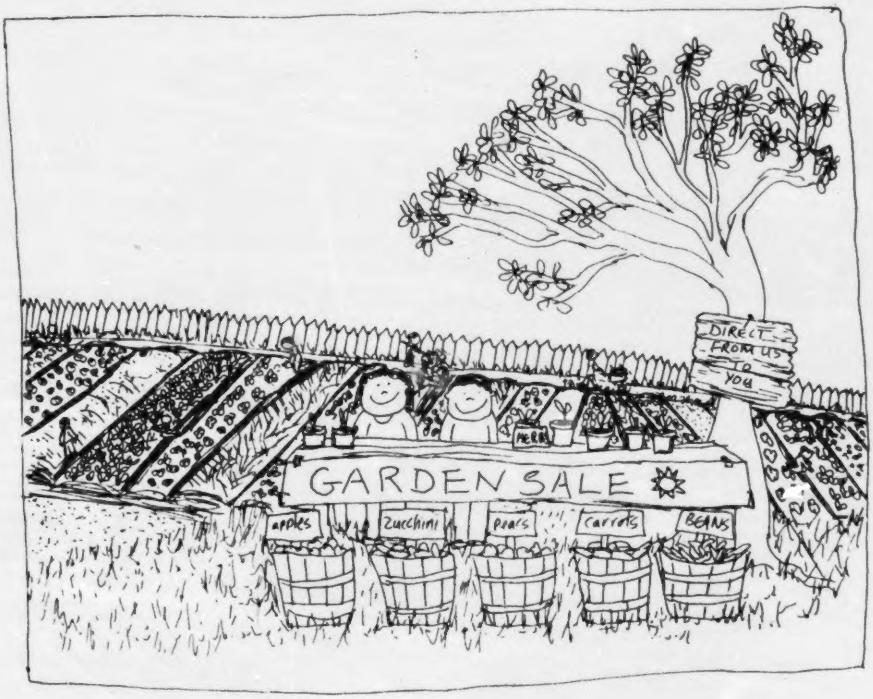
*Invite a supermarket chain's produce manager to class. Interview the manager to find out how stores purchase produce. Can they buy direct from local farmers? How does out-of-season produce get to the store from where it is grown?

MORE

Why don't stores carry only local produce? How many people will handle the food in between the farmer and the store? Compare the steps an apple from New Zealand goes through to reach a supermarket in Santa Cruz vs. an apple grown in Santa Cruz. Which will be more expensive? Which will be fresher? Would you change your eating habits to eat only local produce?

*Harvest some produce from your garden and sell it at a local farmer's market or to a produce stand. How will you determine your price?

*Make a seasonal stew with fresh fruits or vegetables that are in season locally.


DIRECT FROM US TO YOU
HERB
GARDEN SALE
apples
zucchini
pears
carrots
BEANS

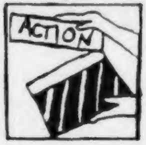
THE NEW IMPROVED MADISON AVENUE DIET

EAT GOOD CUZ YOU SHOULD!

purpose

To use deductive reasoning to determine how advertising influences us.

Materials: Whole food ads from newspapers and magazines, parts of ads, 8" x 11" sheets of oak tag, glue, crayons.



In this lesson students will analyze newspaper and magazine ads to discover the techniques used by companies to sell their products.

Advertising affects all of us in the products we choose. The food industry spends $6 billion annually in advertisements. Action for Children's Television, a consumer group, counted 7,000 TV ads for sugar products in one year. In analyzing all of the food ads directed toward children, two-thirds are for high-sugar products. Thus it is important for children to learn that advertising does not reflect nutritional quality.

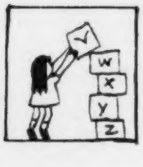
*Discuss with students the purpose of advertising. Where do we find food advertisements? (TV, newspapers, magazines, radios, at the stores.)

*Look at the magazine and newspaper ads. What techniques are used to sell the food? Make a list on the blackboard. (Possible choices: pretty pictures of product, pretty pictures of something else, cheap prices, healthy for you, tastes good, will make you be like someone else, catchy slogan).

*Lead students through imagining a type of food they would like to sell.

*Make your own magazine ad. From the parts of ads, have students make their own ad to sell their imagined product. Share ads with the rest of the group. What techniques are used?

Why do companies spend so much money advertising? Name three techniques that are used to sell products. How do you think advertising influences you? Name four things you will check for when you watch TV ads. What does advertising have to do with nutrition?



Make up some class slogans about good nutrition. Contact a local radio station to find out how the class can tape the slogan and have them play it as a Public Service Announcement.

Try It You'll Like It!

purpose

To experiment with the influence of advertising.

Materials: Food samples of food to be advertised; art supplies.

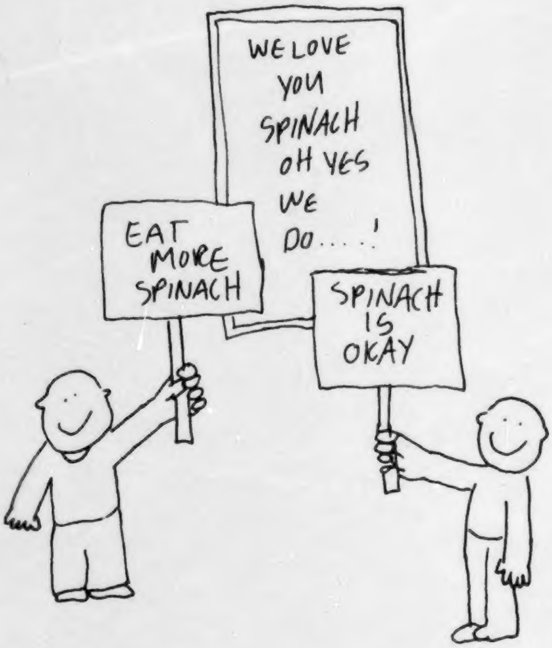
ACTION

In this lesson students will design an advertising campaign by selecting a little-known fruit or vegetable and trying to influence another class to eat more of it.

*Ask another teacher to join in this lesson by allowing the ad campaign to be given to his/her class. The campaign should last for an extended time period. (We suggest one month.)

*Have your class design the ad campaign:

1) Select a fruit or vegetable that isn't well-known but is available. (Suggestions: kohlrabi, swiss chard, kiwis, turnips.)
2) Select techniques they want to use to have more people in the other class to eat the fruit or vegetable. (Suggestions: free samples, posters in their classroom, slogans, skits.)
3) Establish a time-line of when and how the techniques will be used.

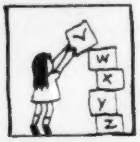


*Establish pre and post measurements for the campaign by offering a limited amount per person of the fruit or vegetable to the test class. Tally the amount left over. (Be sure students don't give their test sample to another classmate.) Do this test before the campaign begins and as soon as it is completed.

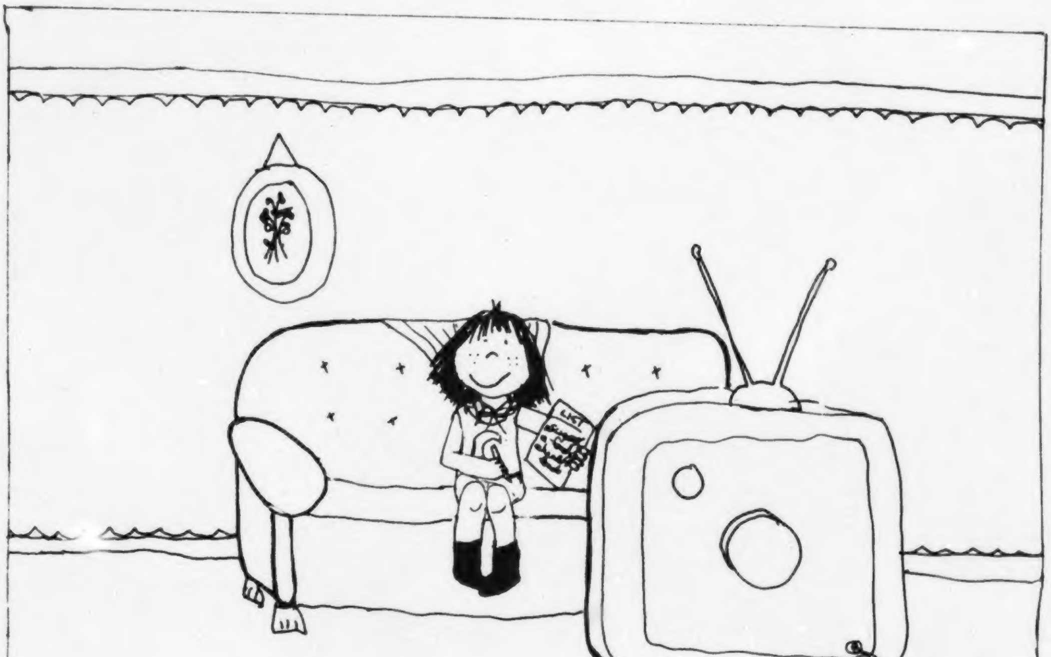
*Analyze your results and discuss the influence of advertising on all of us.

MORE

What techniques worked best with the class? Do companies use those same techniques a lot? If you were selling the food you advertised, how much would you have increased your sales? Do you think it is fair to influence a consumer through advertisements?



Have students make a check-list of techniques they can look for when watching ads.

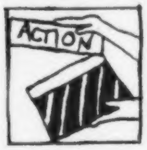


Buy Me! Buy Me!

purpose

To use graphing skills to determine what influences your individual food selection.

Materials: journal, pencil



In this lesson students will analyze the influence on their food choices by filling in the chart below.

*Have students imagine that their parents are going out of town for three days and they will be in charge of all the food. Have them plan the meals and snack and mentally purchase the foods they need.

*Have them list the specific foods and then check on the graph their reason for purchasing it.

WHAT YOU BOUGHT	INEXPENSIVE	EASY TO FIX	SAW ON T.V. (ADVERTISING)	HAS HIGH NUTRITIONAL VALUE	HAS NOTHING ARTIFICIAL IN IT	MY PARENTS BUY IT	WANT TO TRY SOMETHING NEW	CATCHY PACKAGING PRISE INSIDE)	FRIEND SAID TO TRY IT	ON SALE	MY FAMILY LIKES IT	OTHER
1. whole wheat bread				X	X			X	X			
2. KING vitamin			X								X	
3. carrots	X	X		X	X	X					X	
4. tuna		X		X		X						
5. rice	X		X	X	X	X					X	
6. tang		X	X				X				X	
7. pickles		X								X	X	

*Add up the checks under each category and discuss why we buy certain foods and how advertising persuades us.

What was the reason that influenced you the most times? Name two reasons that did not influence you a lot, but that you may think of next time. What do you think are the three most important reasons for choosing food items?

Adapted from Energy, Food, and You. Washington State Office of Environmental Education

390

Feast or Famine

purpose

To develop awareness of existing hunger in the world.

Materials: unshelled peanuts (1 per student)

In this lesson students will work together to develop solutions to the hunger problem that exists around the world.

While we face beautiful supermarket shelves and learn to be critical consumers, more than ¼ of the world does not have enough food to eat. The world's population is 3,635,000,000. One billion people are hungry today. Fifteen million people die from starvation each year. Three-quarters of these deaths are children. When the amount of food eaten is below the amount of body energy a person uses, the body uses its own tissues as an energy source and this leads to starvation.

We produce enough food right now to feed all of the people in the world. If the cattle in the United States were fed on grazing lands rather than grain, all that grain could feed all of the hungry people.

*Distribute peanuts according to the percentage of hungry people in the world. One-quarter of the class does not receive any peanuts. The peanuts are given to the remaining 3/4 of the class with some students receiving more than others.

*Tell students the peanuts represent how food is distributed around the world with some people having an abundance while others have nothing.

*Have the class work together to solve their food distribution problem. Have students discuss a number of solutions, and means of redistribution. How can the students with an abundance help the hungry students without giving their food away? (Increase farming production at the local level.)

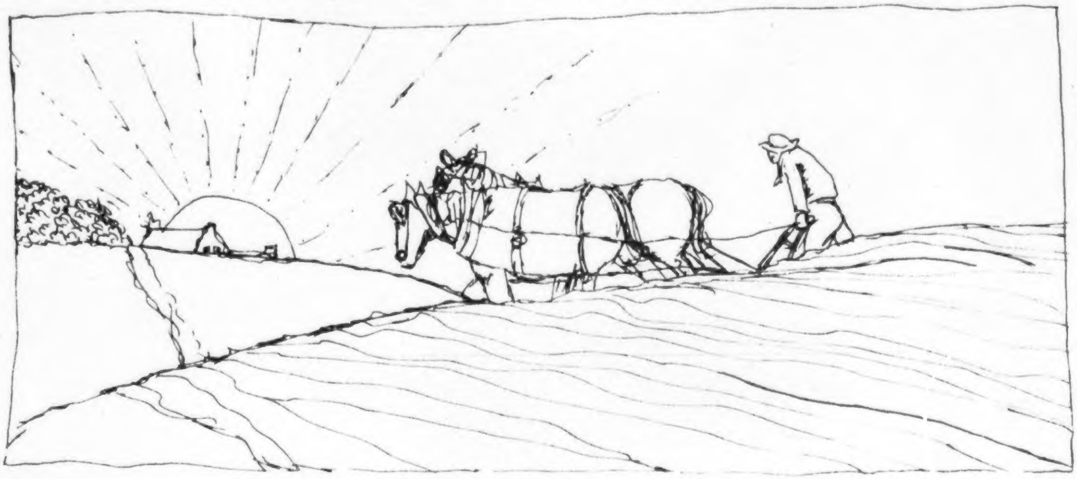
MORE

How would it feel to be starving? How does it feel to know there are people starving right now? Name two solutions your class developed to the hunger problem. How could you help initiate those solutions?

*Choose four countries with starvation problems. (Mexico, Guatemala, Peru, Nigeria, Kenya, Somalia, Turkey, India, Bangladash, Laos.) Research what the people eat and what is grown there. Compare it to the United States.

*Write for "Who's Involved with Hunger: An Organization Guide" from the American Freedom from Hunger Foundation and World Hunger Education Service; 1625 Eye Street NW, Washington, D.C. 20006. Investigate what different organizations are doing to help.

*Make a list of what you can do to help others and to eat better.



*A story to conclude lesson with:

"A rabbi spoke with the Lord about heaven and hell. 'I will show you hell', said the Lord. And they went into a room which had a large pot of stew in the middle. The smell was delicious and around the pot sat people who were famished and desperate. All were holding spoons with very long handles which reached to the pot, but because the handles of the spoons were longer than their arms, it was impossible to get the stew back into their mouths. Their suffering was terrible.

'Now I will show you heaven', said the Lord. They went into an identical room. There was the same pot of stew and the people had the same identical spoons, but they were well nourished, talking and happy. At first the rabbi did not understand. 'It is simple', said the Lord. 'You see, they have learned to feed each other.'"

From Earth Wisdom,
by Dolores La Chapelle

Recipes

FROM: BETSY'S KITCHEN
NAME: BETSY'S SUPRISE
INGREDIENTS:
1cup tomatoes chopped
2cups flour
1 egg
½ cup smash peanuts
Flour
1cup
¾
½
¼

How can we talk so much about food without eating? At Life Lab we follow each nutrition lesson with a snack. Often the snack relates directly to the lesson or one of the science or gardening lessons. Snack preparation is always looked forward to -- and readily devoured, especially when it involves vegetables the students grow.

These lessons start with parts of the plant (from seeds to sprouts - to roots, stems, leaves - and fruits); followed with whole grain recipes; dairy recipes; and finally, simple, but balanced meals. The section ends with the class favorite of creating a festive salad from the garden.

We selected snacks that could easily be made by the students. Have students make recipe books so they can try their favorites again at home. See sample on page 395.

Lesson Titles

My Recipe	
The Seed That Started Halloween	Roasted Pumpkin Seeds
Ah, Soy!	Soy Nuts
Snap, Crackle, & Pop	Popcorn
The Sprout Shout	Alfalfa Sprout Salad
Hairy Apples	
Rooting For Roots, Stems, & Leaves	Raw Vegetables and Dip
Please Don't Eat The Daisies	Flowers, Fruits, and Seeds With Dip
The Great Cover-Up	Dip Recipes
A Tough Apple	Fruit Leather
The Apple Smash	Apple Juice
When The Well Runs Dry	Dried Fruit
Shaky Fruits	Banana Carob Smoothies
Mrs. Price's Wonder	Whole Wheat Bread
The Thin Winner	Whole Grain Crackers
Bran New!	Bran Muffins
Cream Of The Crop!	Butter
Have I Got Culture!	Yogurt
The Bumpy Road	Cottage Cheese
The Crunch Muncher	Granola
Growing Power	Lentil Soup
Roof-of-the-Mouth Special	Peanut Butter And Banana Sandwich
Garden Delight	Dinner Salad

My Recipe

TODAY WE MADE ______________________

INGREDIENTS:

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

______________________ ______________________

DIRECTIONS:

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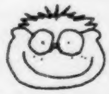
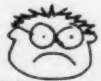
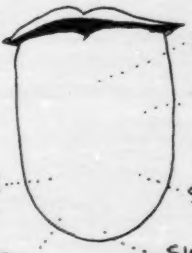
○ 

I LIKED IT!

○ 

I DIDN'T LIKE IT!

IT WAS:



BITTER ○

SOUR ○

SOUR ○

SALTY ○

SALTY ○

SWEET ○

IT WAS:

- ○ HARD
- ○ CRUNCHY
- ○ GUSHY
- ○ CRACKLY
- ○ SOFT
- ○ HAIRY
- ○ STICKY
- ○ CHEWY

YOU MAKE SOME UP:

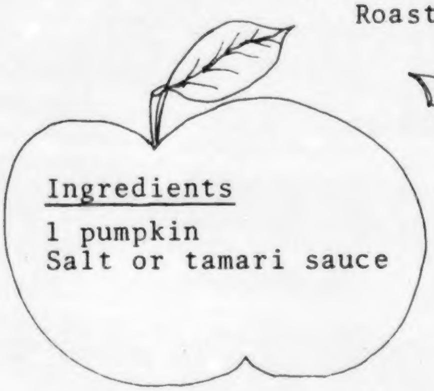
○ ______________

○ ______________

○ ______________

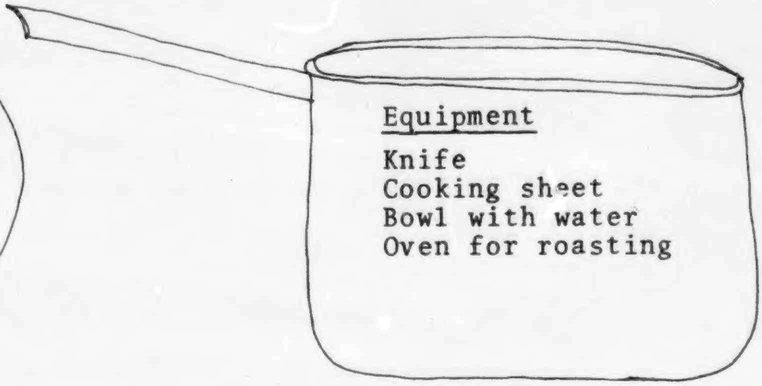
The Seed That Started Halloween

Roasted Pumpkin Seeds



Ingredients

1 pumpkin
Salt or tamari sauce



Equipment

Knife
Cooking sheet
Bowl with water
Oven for roasting

Directions

*Harvest seeds from pumpkin.

*Rinse and place on cookie sheet.

*Sprinkle with salt or tamari sauce.

*Roast in oven at 300° for 20 minutes.

Edible Thoughts

What is the purpose of the shell for the plant?
(The pumpkin is the fruit of the plant. The hard shell protects the small seeds and thus the future generations of the plant.)

What other plants produce 'seed-holders' (fruits) that resemble pumpkins?
(Squash, zucchini, acorn, butternut, crook neck, etc. These are all related. Pumpkins are part of the squash family.)

In nature, how do the seeds get into the ground?
(The pumpkin rots, and the seeds are exposed to the environment.)

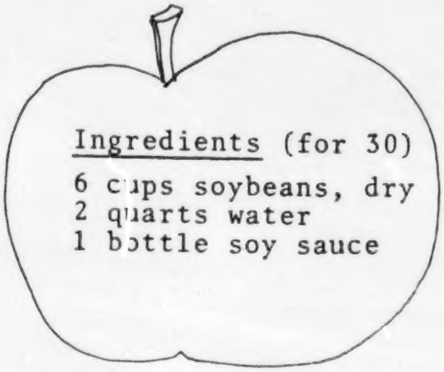
Why are there so many seeds inside the pumpkin?
(To guarantee that some will reproduce.)

What are some other seeds you can eat?
(Walnut, sunflower, almonds...)

Why are seeds nutritious?
(They contain all the necessary nutrients for a seedling to begin its growth.)

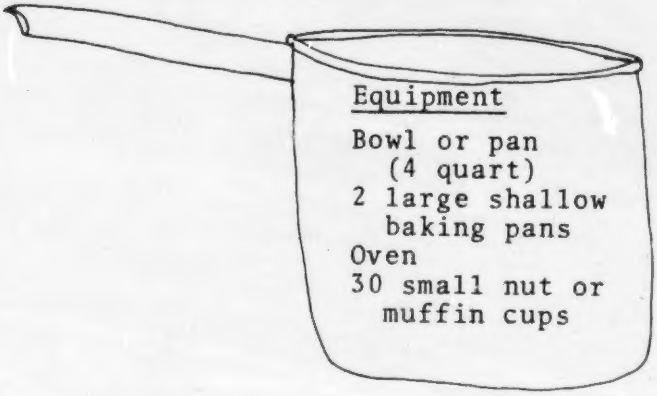
Ah, Soy!

Soy Nuts



Ingredients (for 30)

6 cups soybeans, dry
2 quarts water
1 bottle soy sauce



Equipment

Bowl or pan
(4 quart)
2 large shallow
baking pans
Oven
30 small nut or
muffin cups

Preparation

*Rinse beans to remove any dirt.

*Soak beans overnight in water.

*Drain.

Directions

*Place beans in baking pan.

*Bake, stirring frequently, at 300° for 75-90 minutes or until browned and crunchy.

*Remove from oven and while still hot, sprinkle soy sauce over nuts and stir very well until all nuts are coated.

*Cool and eat.

Edible Thoughts

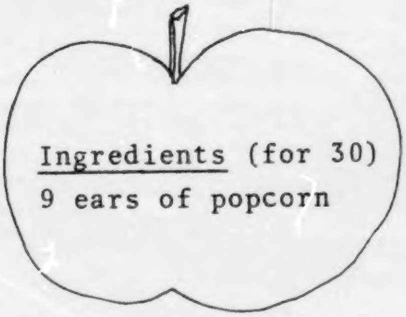
Soybeans are a very old food. They were discovered in China 4,000 years ago. Today they are the largest cash crop in the world.

They provide us with protein, and they are called the 'Cow of China' because the Chinese extract milk from the beans. From one acre of soybeans, 2,900 people can get all of the protein they need for one day. The number of cows that can graze on one acre will provide only 163 people with the protein they need for one day.

Soybeans are made into many different foods: tofu, tempeh, soy milk, soy oil, soy margarine, plus more!

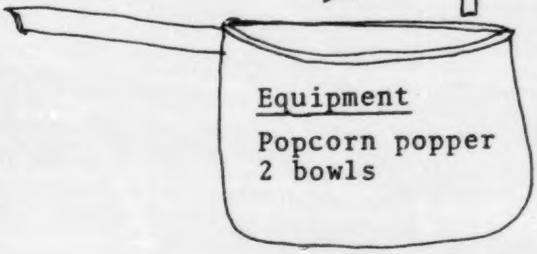
Snap, Crackle and Pop!

Popcorn



Ingredients (for 30)

9 ears of popcorn



Equipment

Popcorn popper
2 bowls

It is a real treat to grow your own popcorn. It should be planted in the spring just like corn. Be sure to plant it in blocks for good cross pollination. And don't plant it near other corn varieties.

The corn will be harvested in the Fall. Hang the popcorn to dry. We let ours dry over winter and then enjoyed it as a spring snack.

Directions

*To remove kernels, rub ears against each other. If the popcorn is ready, they should loosen easily.

*Pop the corn! We use an electric air popper so no oil is necessary.

*The sweet popcorn does not need salt or butter which are both bad for our health.

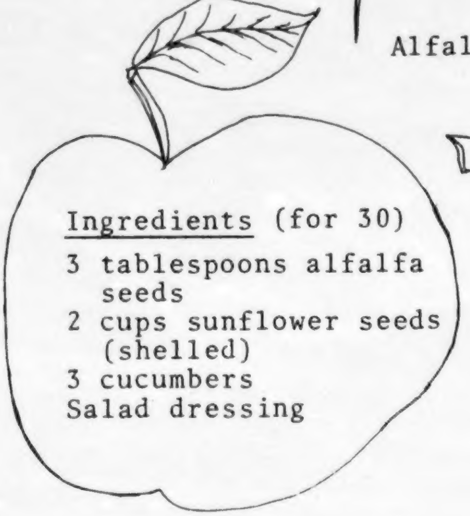
Edible Thoughts

What makes the corn kernel pop?
(The heat expands the kernel-which is a seed- until it pops.)

Imagine how someone discovered that corn could pop and be eaten.

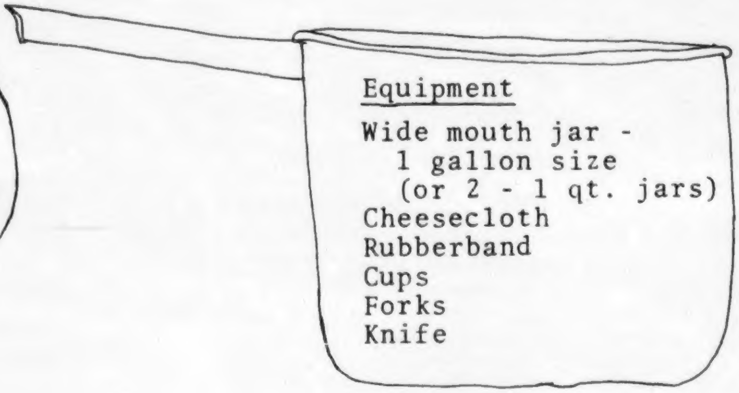
The Sprout Shout

Alfalfa Sprout Salad



Ingredients (for 30)

- 3 tablespoons alfalfa seeds
- 2 cups sunflower seeds (shelled)
- 3 cucumbers
- Salad dressing

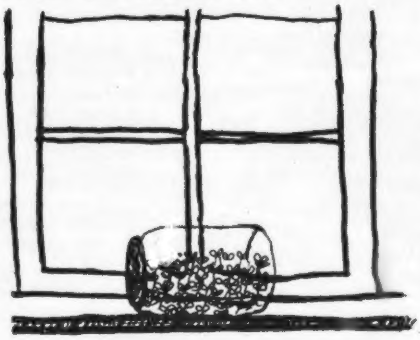


Equipment

- Wide mouth jar - 1 gallon size (or 2 - 1 qt. jars)
- Cheesecloth
- Rubberband
- Cups
- Forks
- Knife

Preparation: Have students start alfalfa sprouts in class one week before lesson by:

1) Soaking 3 tablespoons of alfalfa seeds in water overnight.
2) Place the seeds in a 1 gallon jar and cover opening with cheesecloth.
3) Rinse the seeds twice a day--draining all water after each rinsing.
4) Sprouts will be ready to eat in 5-7 days.



Directions

Mix sprouts, sliced cucumbers, shelled sunflower seeds in a cup. Add salad dressing if desired.

Edible Thoughts

What is a sprout? (The plant starting to grow from the seed.)

What did the alfalfa seed need to sprout? (water, light, air--it did not need food.)

The sprouting of a seed is called seed germination. Look at a sprout. See if you can find the roots and the stem.

What happens to the seed? (It falls off as the plant bursts out of it. You can still find it attached to some of the sprouts.)

What color is the sprout? (Sprouts start to turn green when the plant starts to make its own food.)

Hairy Apples

Ingredients

8 large apples
1 pound peanut butter (see peanut butter recipe page 417)
Alfalfa sprouts (see page 399)
Raw sunflower seeds (Optional)

Equipment

Table knives

Directions

Cut apples into slices, 6 slices per apple. Spread with peanut butter and sprinkle with sprouts. You may want to sprinkle with raw sunflower seeds.

Edible Thoughts

It's fun to make different combinations of foods. Why not choose 3 foods you would like to combine and design your own food creation! Have the class share their new treats.

Rooting for Roots, Stems, and Leaves

Raw Vegetables and Dip

Ingredients

The edible roots, stems, leaves of vegetables
- Roots: radishes, carrots
- Stems: celery, kohlrabi
- Leaves: spinach, swiss chard

Dip (page 403)

Equipment

Cutting Board
Knife

Directions

*Slice vegetables into 'sticks'

*Prepare dip

Edible Thoughts

Before students eat snack have them identify the part of the plant they are eating.

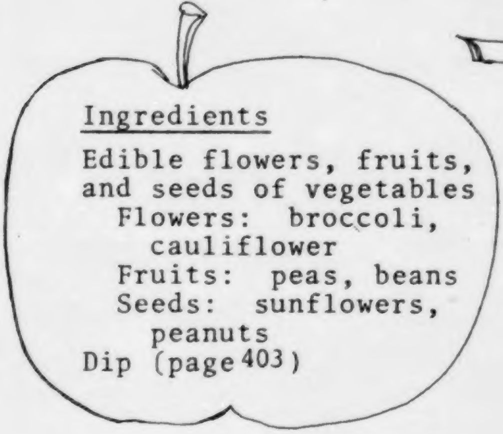
Roots: grow underground. Through the roots, plants are furnished with food and water through the soil.

Stems: are the parts between the roots and the leaves. Stems carry food and water from the root to all parts of the plant. The stem supports the plant as the trunk supports the tree.

Leaves: Leaves are where the plant produces food. The darker green the vegetable, the higher in food value.

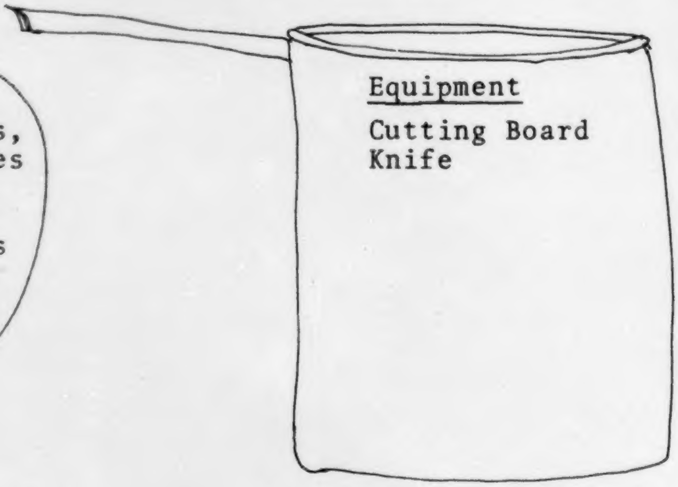
Please Don't Eat the Daisies

Flowers, Fruits, and Seeds with Dip



Ingredients

Edible flowers, fruits, and seeds of vegetables
  Flowers: broccoli, cauliflower
  Fruits: peas, beans
  Seeds: sunflowers, peanuts
Dip (page 403)



Equipment

Cutting Board
Knife

Directions

*Slice vegetable into 'sticks'

*Prepare dip

Edible Thoughts

Before students eat snack, have them identify the part of the plant they are eating.

Flower: is the reproductive part of the plant. It is where the seeds will form.

Fruit: protects the seed until the seed matures and can survive on its own. When the fruit falls from the plant, it will decompose and the seed will enter the ground. Not all seeds are protected by fruits.

Seeds: hold the embryo which can become a whole new plant. Seeds come in all shapes and sizes and are the major way plants reproduce.

The Great Cover-up

Dip Recipes

Dip Recipes:

Cottage Cheese Dip

Combine ½ cup cottage cheese with either column of ingredients:

1 tablespoon grated onion
1 teaspoon chopped green pepper
1 tablespoon chopped celery
1 teaspoon dill

or

¼ cup chopped nuts
¼ cup chopped dried fruit
2 teaspoons lemon juice

Guacomole

1 ripe avocado
1 small onion, finely chopped
1 teaspoon lemon juice
1 ripe tomato
¼ cup mayonnaise
salt and pepper

Remove pit and pulp of avocado and chop. Mix with everything else.

Hummus

1 cup cooked or canned garbanzo beans
¼ cup tahini (sesame seed butter)
1 clove garlic, crushed
Juice of 1½ lemons (½ cup)
2 sprigs parsley, chopped
salt to taste

Buzz in blender until smooth or mash with fork. Add water if paste gets too thick.

Herbed Yogurt Dip

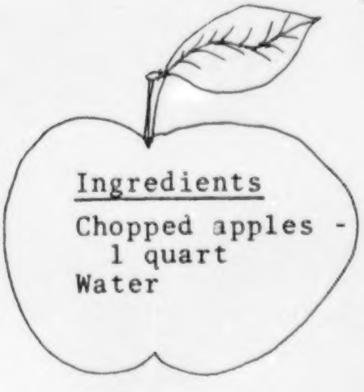
1 cup plain low fat yogurt
2 teaspoons dried onion
2 teaspoons dried parsley
¼ teaspoon dill
1/8 teaspoon celery salt

Mix well and chill.

ME TOO!
ME TOO!
GEE I JUST LOVE DIPS!

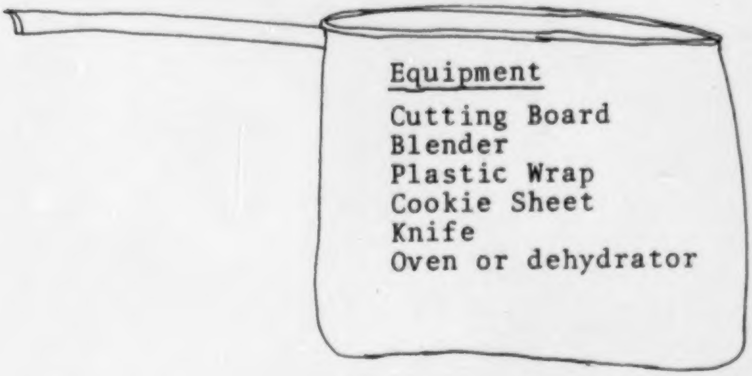
A Tough Apple

Fruit Leather



Ingredients

Chopped apples -
 1 quart
Water



Equipment

Cutting Board
Blender
Plastic Wrap
Cookie Sheet
Knife
Oven or dehydrator

Directions

*Prepare apples by coring and chopping them. Do not peel them. Place just enough water in a blender with a few apple chunks to start the blender action. Add apples until mixture is that of applesauce.

*Plastic Wrap: You will need about 12" x 18" spread out on a cookie sheet and taped so the plastic doesn't curl. Spread apple mixture evenly on plastic (about 1/4" thick).

*Place in dehydrator or in oven at low temperature over night. Fruit will be clear and leatherlike when ready. Roll into a scroll and cut into required number of pieces.

Edible Thoughts

Apples are one of the oldest cultivated fruits. There are records of different varieties of apples from ancient Greece.

When the United States was first being settled there was a man who traveled the country from Pennsylvania to Ohio. He would live on very little, and wear as little clothing as possible. Even in winter, he would travel without shoes. In the Fall he collected apple seeds from the cider mills in Pennsylvania. Then he would start walking westward, and along the way he would set up nurseries by planting his apple seeds. He did this in Pennsylvania and Ohio. He would return to the places where he planted the trees a year or two later. He would dig the trees up and trade them to settlers in the area. He became known as Johnny Appleseed. Why not save some seeds today? Let them sit outside over winter, and then plant them in spring.

The Apple Smash

Fresh Made Apple Juice

Ingredients

Apples

Equipment

Apple press (try to borrow an old fashioned hand press)
Cutting Board
Knives
Bucket/pitcher
Glasses

Directions

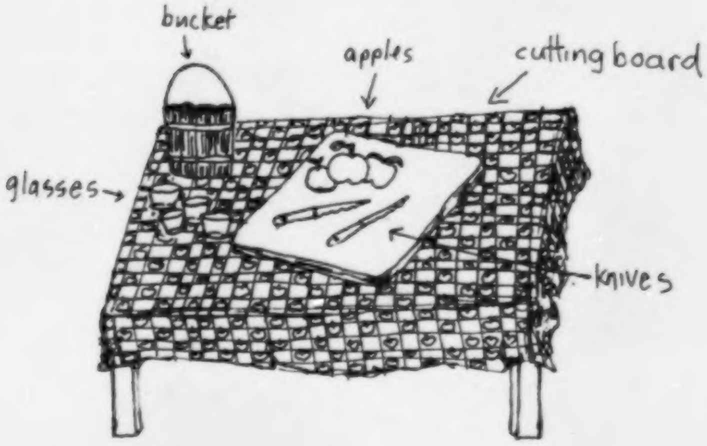
Cut the apples and process them according to the directions of the apple press. Enjoy the sweet juice.

Edible Thoughts

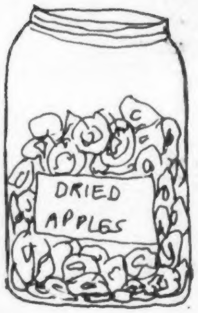
What do you need to add to an apple to make apple juice?

Where does all the liquid come from? (An apple is mostly water.)

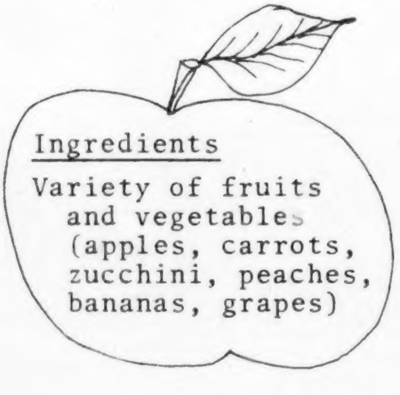
Do you need to add sugar? (No, the apple has natural sugar in it.)



When the Well Runs Dry

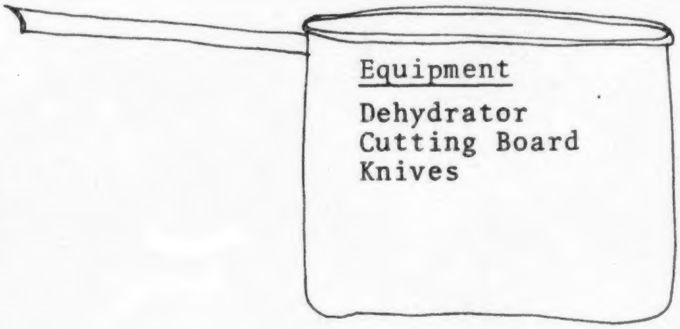


Dried Fruit



Ingredients

Variety of fruits and vegetables (apples, carrots, zucchini, peaches, bananas, grapes)



Equipment

Dehydrator
Cutting Board
Knives

This is a great way to demonstrate how food can be preserved. If you don't construct a solar drier, you can place the produce on a screen in the sun. (Be aware of ants, wind, and flies!)

Directions

*Slice the fruit and vegetables in thin slices.

*Lay them out on screens to dry so they are close together but not touching.

*The produce is ready when it appears leathery and shriveled.

Edible Thoughts

What happens to the nutrients in the fruits/vegetables when you dry them?
(The water is evaporated from them. All other nutrients remain the same. The food shrinks so much because it has so much water in it.)

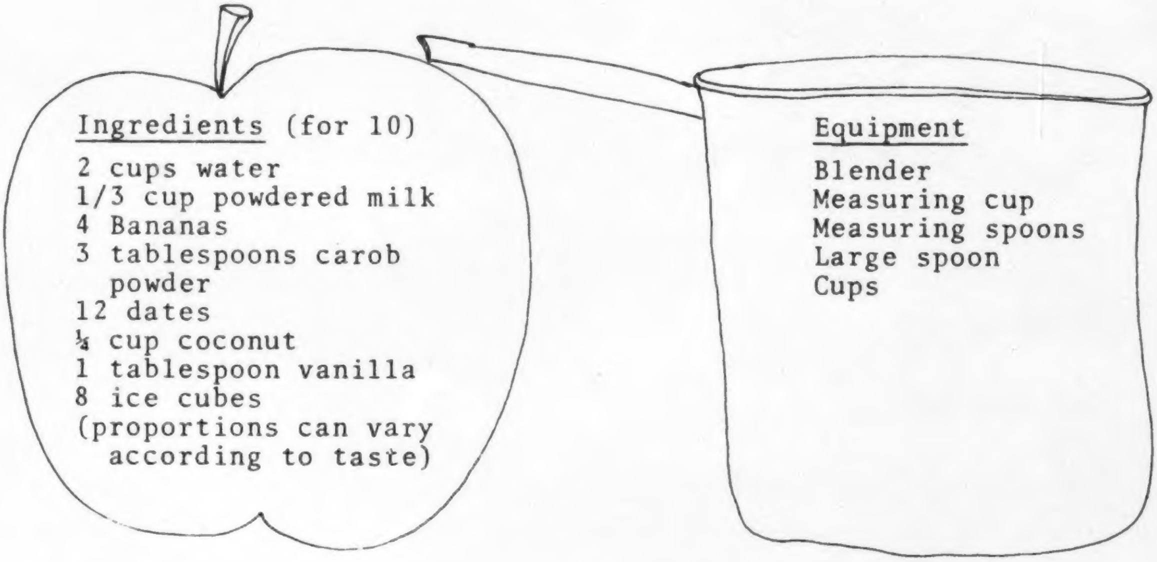
Why is food drying important?
(Food drying is a way to preserve foods. Many fruits become ripe within a short period of time. Since they all can't be eaten at once, and we like to have them year-round, we change them into forms that won't rot. Freezing and canning are other means of preserving food.)

What happens when you soak dried fruit in water?
(It will absorb the water and look almost as it did before.)

Shaky Fruits

Banana Carob Smoothies

Smoothies are a great way for students to learn they can prepare fun drinks with fruits. Try different combinations.



Ingredients (for 10)

2 cups water
1/3 cup powdered milk
4 Bananas
3 tablespoons carob powder
12 dates
¼ cup coconut
1 tablespoon vanilla
8 ice cubes
(proportions can vary according to taste)

Equipment

Blender
Measuring cup
Measuring spoons
Large spoon
Cups

Directions

*Add water to the blender.

*Add other ingredients slowly, continually mixing. (Remove pits from dates.)

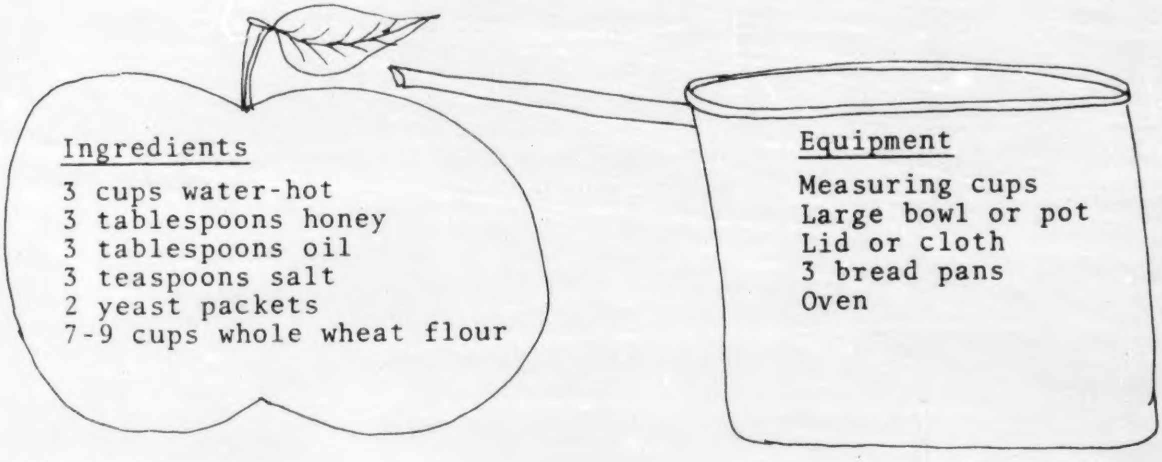
*Serve!

Edible Thoughts

Smoothies are like milk shakes except their flavor comes from fruits rather than ice cream. Why not create your own smoothie? Make up a combination of fruits you would like to try. A smoothie can be juice-based rather than milk-based.

Mrs. Price's Wonder

Whole Wheat Bread



Ingredients

- 3 cups water-hot
- 3 tablespoons honey
- 3 tablespoons oil
- 3 teaspoons salt
- 2 yeast packets
- 7-9 cups whole wheat flour

Equipment

- Measuring cups
- Large bowl or pot
- Lid or cloth
- 3 bread pans
- Oven

Directions

*Stir together hot water, honey, salt until dissolved.

*When lukewarm add yeast.

*Gradually stir in flour until you can no longer absorb any more into mixture. (You may need more than 9 cups.)

*Knead (punch and pull) until it has a satin glow and no longer is sticky.

*Cover with lid or moist cloth.

*Put in warm place (70°-75°) but not too hot. Be sure it is not in a draft.

*After a few hours it will double in bulk. Punch it down and let it rise again for 30-45 minutes.

*Form 3 loaves.

*Put in well-greased pans.

*Let the loaves rise again for 1 hour until double in bulk.

*Bake at 350° for one hour. Rub top with butter. Remove from pan immediately.

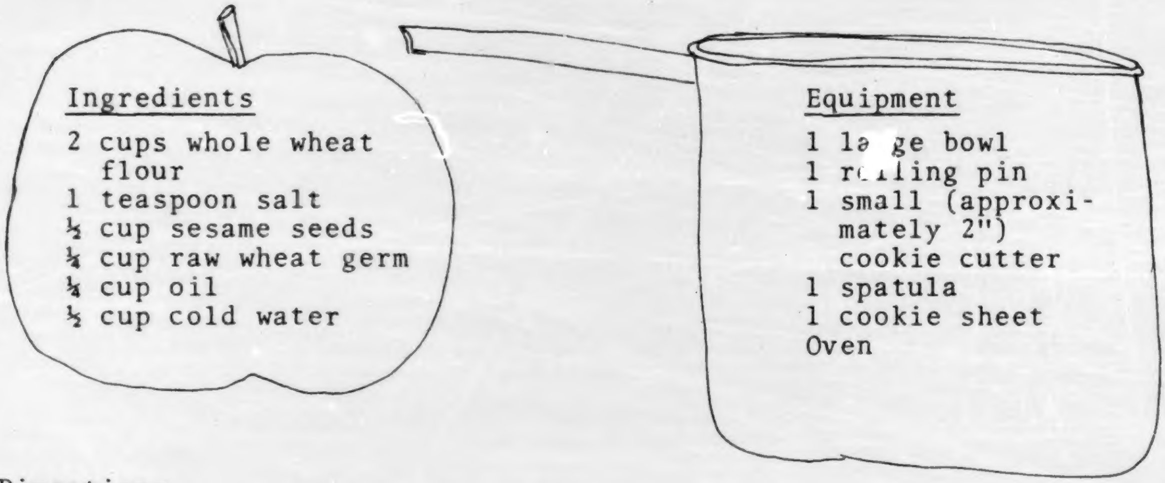
Edible Thoughts

What makes bread rise?
(The yeast are alive! They are fungi and they eat the honey in the dough. As a by-product they give off carbon dioxide. The carbon dioxide causes the bread to rise.)

Discuss the differences in making home-made bread vs. store bought. How long ago was it that people always baked their own breads?

The Thin Winner

Whole Grain Crackers



Ingredients

- 2 cups whole wheat flour
- 1 teaspoon salt
- ½ cup sesame seeds
- ¼ cup raw wheat germ
- ¼ cup oil
- ½ cup cold water

Equipment

- 1 large bowl
- 1 rolling pin
- 1 small (approximately 2") cookie cutter
- 1 spatula
- 1 cookie sheet
- Oven

Directions

*Blend dry ingredients.

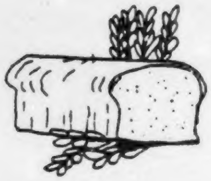
*Add oil.

*Add water.

*Knead at least 10 minutes.

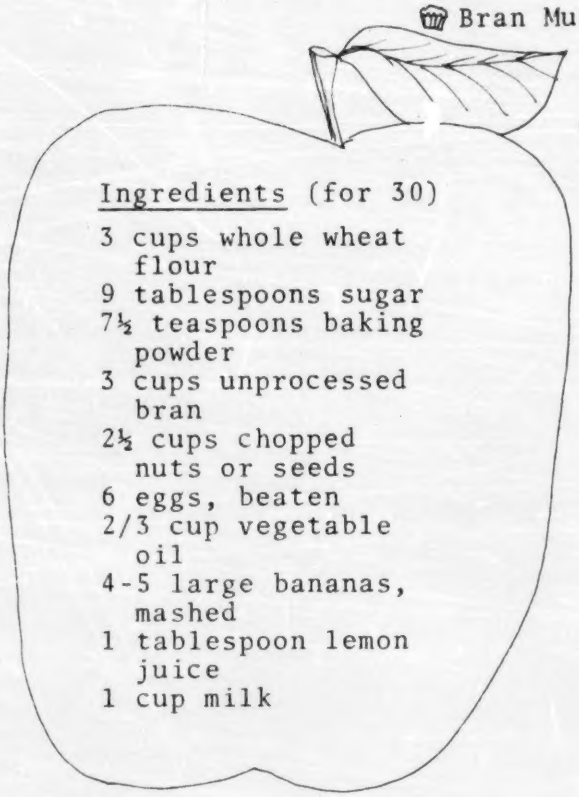
*Rollout and cut with cookie cutter.

*Bake at 400° until golden brown. Turn and continue baking until the other side is golden. (Approximate total cooking - 20 minutes.)



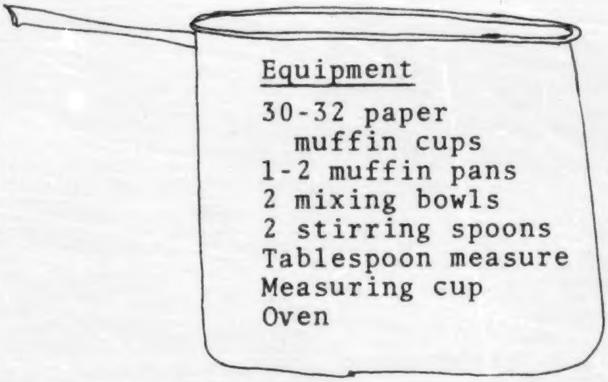
Bran New!

Bran Muffins



Ingredients (for 30)

- 3 cups whole wheat flour
- 9 tablespoons sugar
- 7½ teaspoons baking powder
- 3 cups unprocessed bran
- 2½ cups chopped nuts or seeds
- 6 eggs, beaten
- 2/3 cup vegetable oil
- 4-5 large bananas, mashed
- 1 tablespoon lemon juice
- 1 cup milk



Equipment

- 30-32 paper muffin cups
- 1-2 muffin pans
- 2 mixing bowls
- 2 stirring spoons
- Tablespoon measure
- Measuring cup
- Oven

Directions

*Combine together dry ingredients. Stir.

*Mash bananas and stir in lemon juice.

*Make name flags for everyone's muffin.

*Mix together oil, milk, eggs.

*Add mashed bananas and lemon juice to oil mixture.

*Stir dry ingredients into oil mixture.

*Add chopped nuts or seeds.

*Pour into muffin cups.

*Bake at 400° for about 20 minutes.

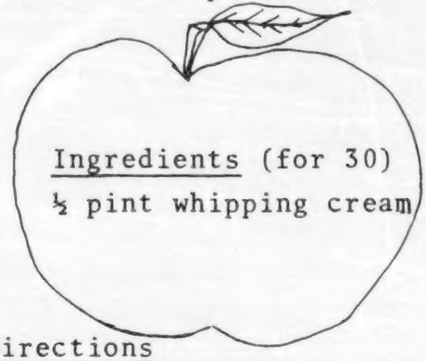
Edible Thoughts

Bran is the seed coat of the wheat berry. It is very nutritious, but unfortunately it is removed from the wheat berry when it is milled into white flour. Whole wheat flour has the bran in it.

Cream of the Crop

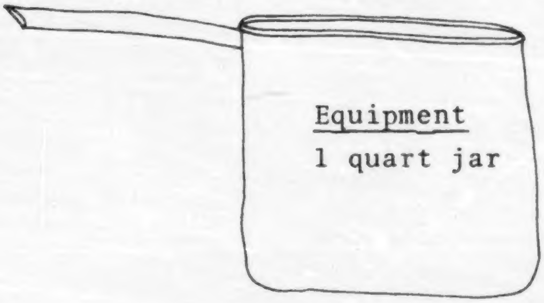
Butter

This is a simple treat to make to accompany the bread.



Ingredients (for 30)

½ pint whipping cream



Equipment

1 quart jar

Directions

*Pour cream into jar and shake until it turns to butter. (There will be a little skim milk to pour off when done.)

Edible Thoughts

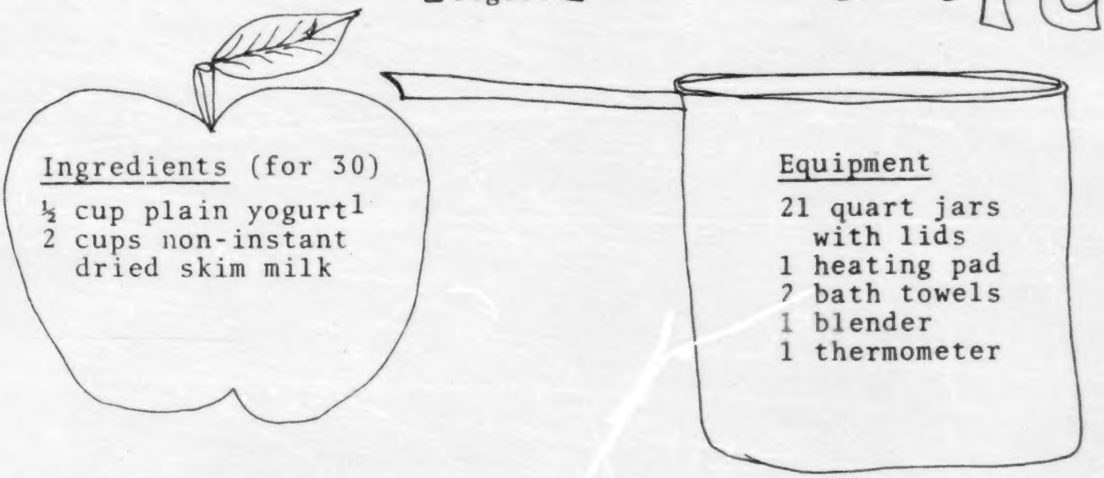
Butter is made from the fat of the milk, therefore it is not good to eat a lot of it. But it certainly tastes good spread on warm bread.

Make a list of the different foods made from milk.

Try to find an old butter churner. Research how people use to make and store their own butter.

Have I Got Culture

Yogurt



Ingredients (for 30)

½ cup plain yogurt[1]
2 cups non-instant
dried skim milk

Equipment

21 quart jars
with lids
1 heating pad
2 bath towels
1 blender
1 thermometer

Preparation

*Wash and sterilize quart jars and lids by boiling for 15 minutes. Water must cover top of jars. Drain upside down on towels and seal with lids.

*Wrap heating pad in a towel. Plug in to preheat.

Directions

*Fill the jars with warm water from the tap to about two inches from the top.

*When the water cools to 100°, measure 1 cup of water into the blender from the first jar.

*Add ¼ cup yogurt and one cup of dry milk.

*Blend until smooth.

*Add to remaining water in first jar and stir.

*Repeat this procedure with the second jar of water.

*Place jars on heating pad in a draft-free area and cover with towels.

*Let yogurt set for 3½ hours.

*When set, refrigerate. Yogurt is set when it resists a light touch of the finger even slightly.

*Try mixing in fresh fruit.

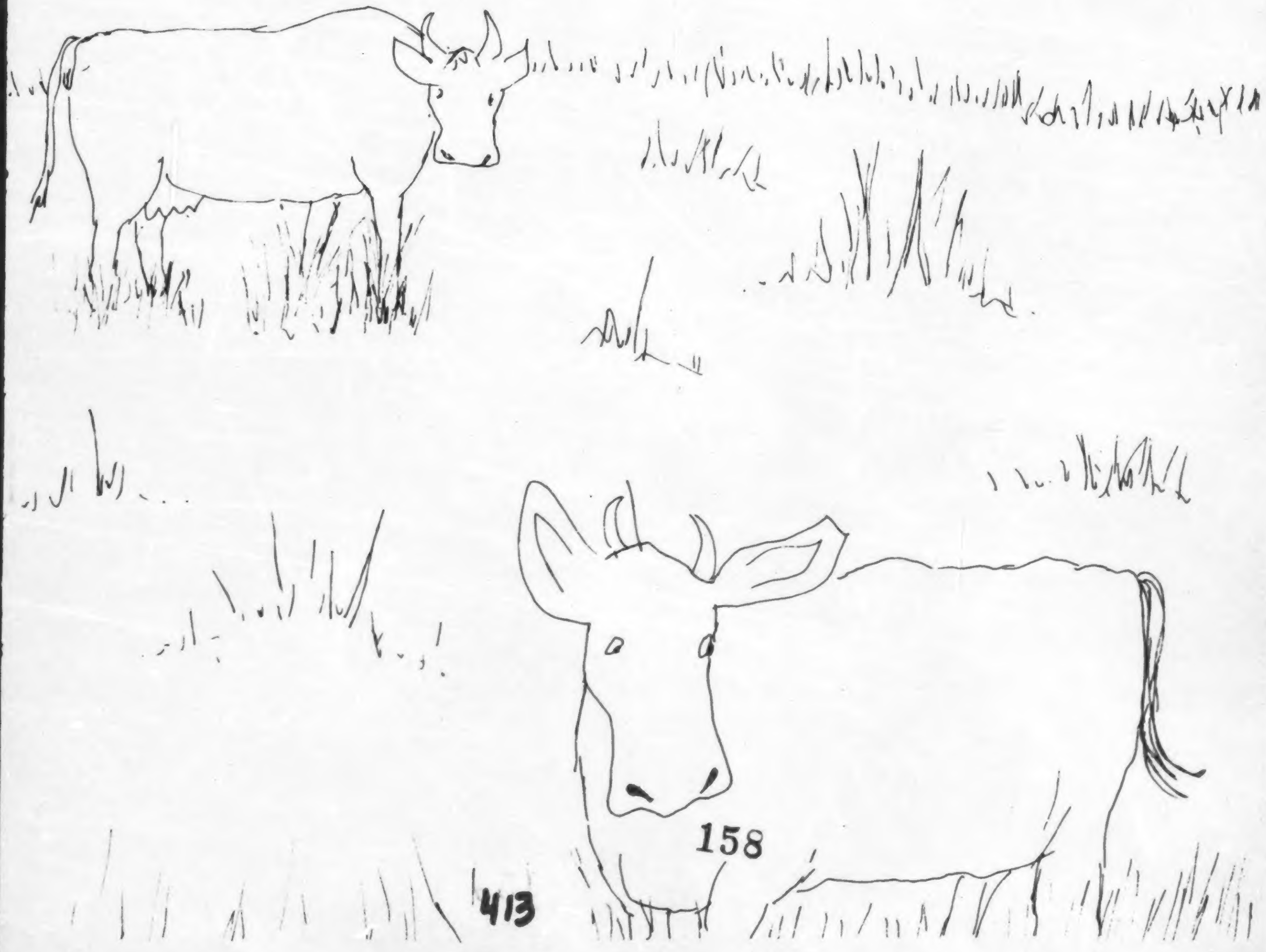
NOTE: This yogurt is NOT as solid as the commercial yogurt. Commercial yogurt has had stabilizers, like gelatin, added to make it firmer.

[1] Do NOT use a yogurt starter that contains stabilizers.

Edible Thoughts

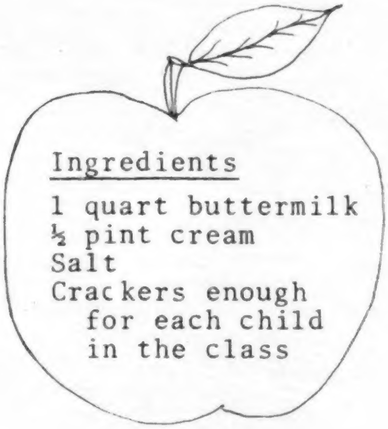
Did you ever think you would eat sour milk? Yogurt is just that. It has a bacteria culture growing in it that gives it its unique quality. Don't worry! The bacteria in yogurt is actually good for you and helps your digestive system.

People in Iran, Turkey and other Middle East countries have eaten yogurt for thousands of years.



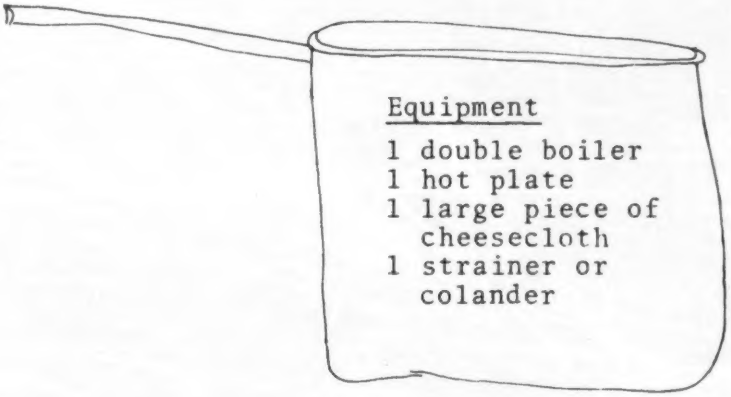
The Bumpy Road

Cottage Cheese



Ingredients

1 quart buttermilk
½ pint cream
Salt
Crackers enough
  for each child
  in the class



Equipment

1 double boiler
1 hot plate
1 large piece of
  cheesecloth
1 strainer or
  colander

Directions

*Heat milk over hot water until lukewarm and it appears to thicken and curdle.

*Remove from heat and let stand in a warm place for a few minutes for curd to collect.

*Turn into a cheesecloth-lined strainer and let whey drain off thoroughly.

*Rinse with cold water and drain again until all whey has drained off.

*Moisten curd with cream and season with salt.

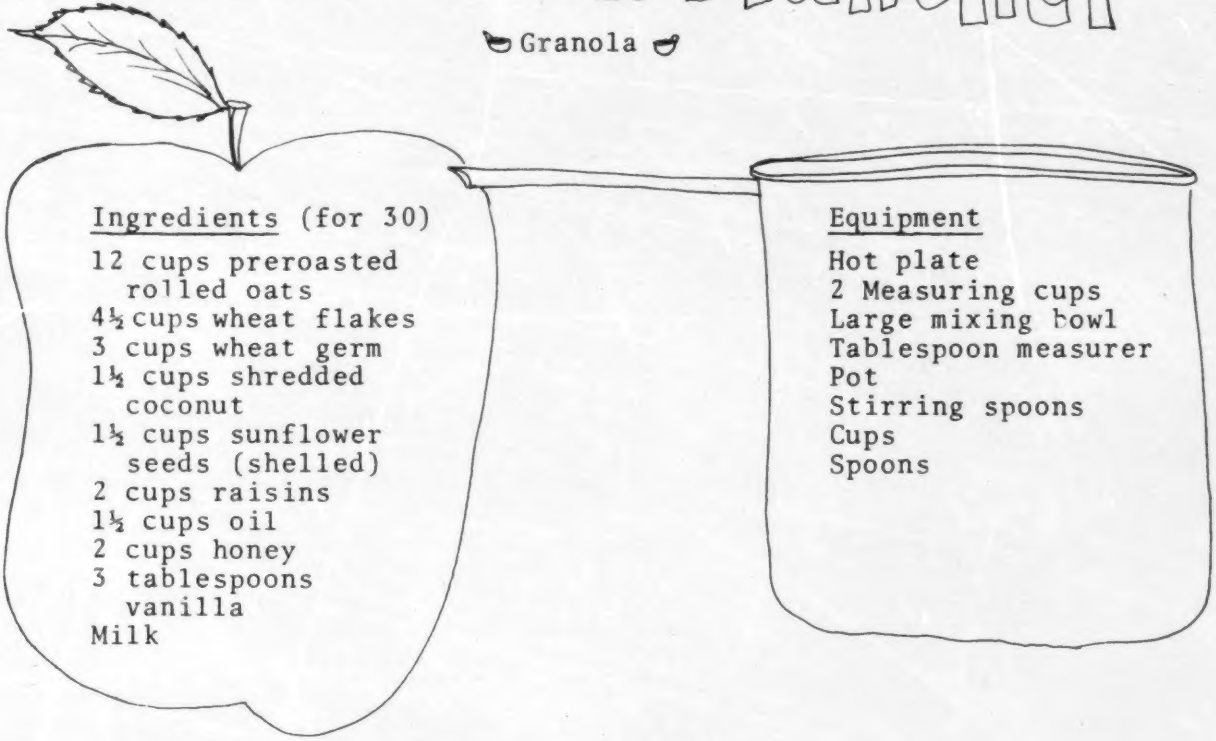
*Makes 1 cup of cottage cheese, enough for each child to have a taste on a cracker.

Edible Thoughts

Use your home-made cottage cheese to make the dip on page 403.

The Crunch Muncher

Granola



Ingredients (for 30)

- 12 cups preroasted rolled oats
- 4½ cups wheat flakes
- 3 cups wheat germ
- 1½ cups shredded coconut
- 1½ cups sunflower seeds (shelled)
- 2 cups raisins
- 1½ cups oil
- 2 cups honey
- 3 tablespoons vanilla
- Milk

Equipment

- Hot plate
- 2 Measuring cups
- Large mixing bowl
- Tablespoon measurer
- Pot
- Stirring spoons
- Cups
- Spoons

Directions

*Mix the oil, honey, and vanilla in pot. Heat mixture on hot plate.

*In mixing bowl combine oats, wheat flakes, wheat germ, coconut, sunflower seeds.

*When honey mixture is warm, mix into dry ingredients. Make sure dry ingredients are well coated with honey.

*Serve in cups with raisins and milk.

Edible Thoughts

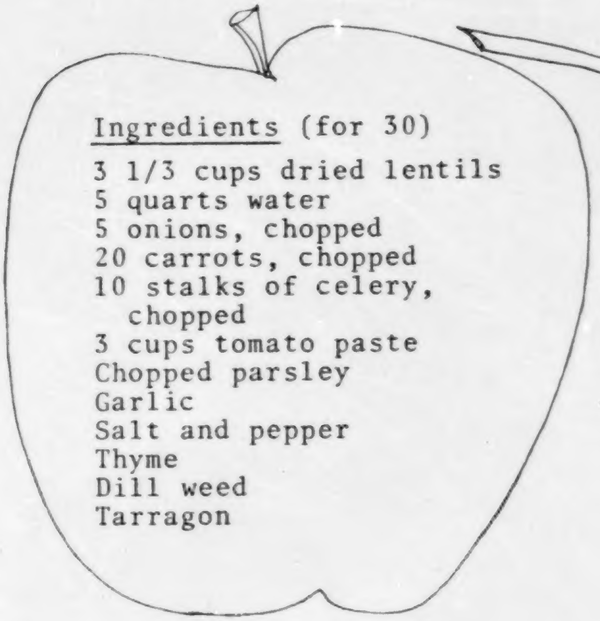
Is granola a balanced meal? (Yes)

Divide the different ingredients into the Basic Food Groups.
(Grain Group - oats, wheat flakes, wheat germ
Fruit/Vegetable Group - raisins, coconut
Milk Group - milk
Protein Group - sunflower seeds
Extra Group - honey, oil, vanilla)

Trace ingredients back to original plant forms.

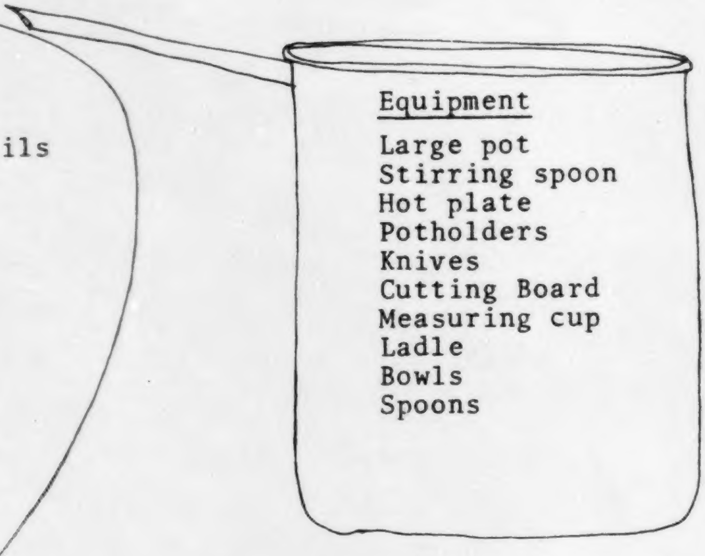
Growing Power

Lentil Soup



Ingredients (for 30)

3 1/3 cups dried lentils
5 quarts water
5 onions, chopped
20 carrots, chopped
10 stalks of celery, chopped
3 cups tomato paste
Chopped parsley
Garlic
Salt and pepper
Thyme
Dill weed
Tarragon



Equipment

Large pot
Stirring spoon
Hot plate
Potholders
Knives
Cutting Board
Measuring cup
Ladle
Bowls
Spoons

Directions

*Put the first 5 ingredients into the pot.

*Add salt and pepper and simmer gently for about 3 hours (replenish the water as needed).

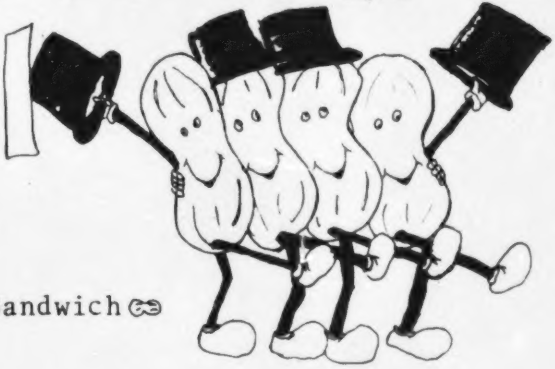
*Add small amounts of the herbs and spices according to taste.

*Stir in the tomato paste and let it heat through.

Edible Thoughts

Lentils are a type of bean and are high in protein. They are an excellent substitute for meat. All beans provide protein. Name 5 other types of beans. What could happen if you put a bean in the ground?

Roof-of-the-Mouth Special



Peanut Butter and Banana Sandwich

Ingredients
(30-½ sandwiches)

1½ tablespoons oil
2½ cups peanuts
1 loaf whole wheat bread
6 bananas
Honey

Equipment

Blender
Stirring spoon
Knives

Directions

*Place oil in blender.

*Slowly add peanuts while the blender is at a low speed. Blend until peanuts are a good consistency.

*Make ½ sandwiches by spreading peanut butter on ½ piece of bread; slice bananas onto peanut butter; spread honey on other half.

Edible Thoughts

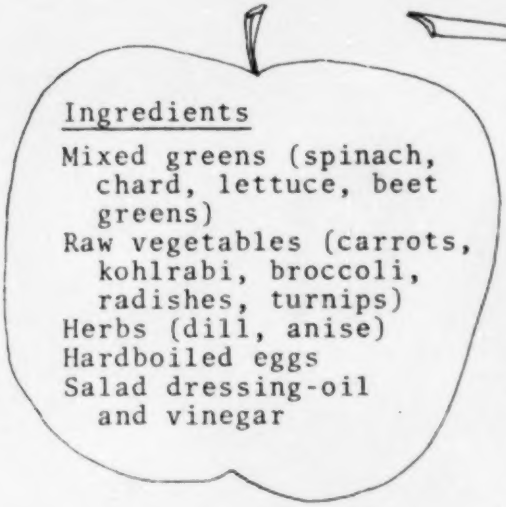
Peanut Butter was invented in 1890 by George Washington Carver, a doctor who lived in St. Louis. Today it is a very popular food with four out of five houses having peanut butter in it. It's very nutritious for us because it's high in proteins and easily digested. Two tablespoons of peanut butter provide eight grams of the 44 grams of protein you need everyday.

There are many different kinds of peanut butter sold today. Check the ingredients label on the kind you have in your house. Is there more than just peanuts? Research the other ingredients.

Garden Delight

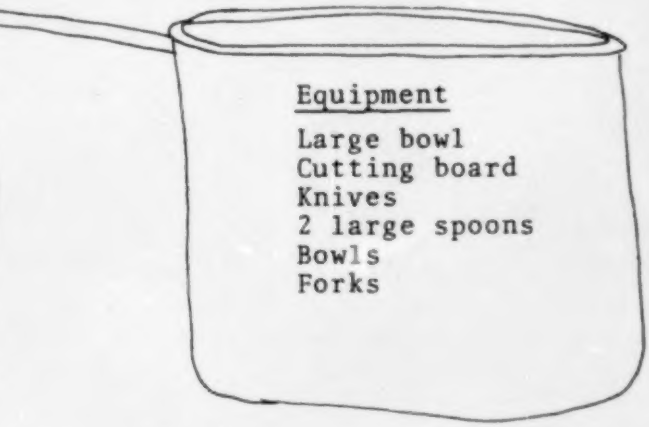
Dinner Salad

This can be a delight prepared with a creative variety from your garden.



Ingredients

- Mixed greens (spinach, chard, lettuce, beet greens)
- Raw vegetables (carrots, kohlrabi, broccoli, radishes, turnips)
- Herbs (dill, anise)
- Hardboiled eggs
- Salad dressing-oil and vinegar



Equipment

- Large bowl
- Cutting board
- Knives
- 2 large spoons
- Bowls
- Forks

Directions

*If vegetables are directly from the garden, be sure to wash carefully to remove all grit.

*Have students share in washing and cutting ingredients.

*Add small amounts of the herbs to the salad to add flavor.

*We suggest oil and vinegar dressing so the flavor of the greens can be tasted.

Edible Thoughts

Compare the differences in eating a salad from your own garden vs. store bought vegetables. Does it taste different to you? Can you put vegetables in it you may not find in the store? Why may it be healthier for you? (It's fresher; if your garden is organic, there are no pesticide poisons on the food.)

How did your garden salad save energy? (The consumer was the producer so there was no energy used to transport it from farm to market to consumer.)

THE END